This Issue Exceeds 103,700 Copies

THE JOURNAL

OF THE

American Medical Association

Subscription, $8.00 | PUBLISHED WEEKLY | Single Copies, 25 Cents

VOLUME 117, No. 19

COPYRIGHT, 1941, BY AMERICAN MEDICAL ASSOCIATION

535 North Dearborn Street, Chicago, Ill.

NOVEMBER 8, 1941

CONTENTS AND SUBJECT INDEX

Liver and Medical Progress. F. C. Mann, M.D., Rochester, Minn. 1577

Surgical Management of Disease of the Gallbladder as Correlated with Newer Physiologic Concepts. Leon Goldman, M.D., and H. G. Bell, M.D., San Francisco.....1582
Discussed by Dr. Cole.

Fractures of the Spine. S. Bernard Wortis, M.D., and Lewis I. Sharp, M.D., New York.....1585
Discussed by Drs. Grant, Pollock, Seletz and Wortis.

Experiences with Thiocyanates. M. H. Barker, M.D.; H. A. Lindberg, M.D., and M. H. Wald, M.D., Chicago 1591
Discussed by Dr. Williams.

The Parotid Gland. A. C. Furstenberg, M.D., Ann Arbor, Mich. 1594
Discussed by Drs. Hoover, New and Furstenberg.

Therapeutic Nerve Block. E. A. Rovenstine, M.D., and H. M. Wertheim, M.D., New York.....1599
Discussed by Drs. McCuskey, Sword, Searles, Eversole and Rovenstine.

Prothrombin Deficiency in Pulmonary Tuberculosis. R. F. Sheely, M.D., White Haven, Pa. 1603

Concentration Method of Radiotherapy for Cancer of the Mouth, Pharynx and Larynx. Max Cutler, M.D., Chicago 1607

The Importance of Air-Borne Pathogenic Bacteria in the Operating Room. Deryl Hart, M.D., Durham, N. C.....1610

Clinical Detection of Hepatic Disease in Hepatolenticular Degeneration. W. H. Sweet, M.D.; S. J. Gray, M.D., and J. G. Allen, M.D., Chicago 1613

CLINICAL NOTES, SUGGESTIONS AND NEW INSTRUMENTS

Osteomyelitis. Matthew S. Ersner, M.D., and Julius Winston, M.D., Philadelphia 1619

COUNCIL ON PHYSICAL THERAPY

Management of the Cerebral Palsies. Winthrop Morgan Phelps, M.D., Baltimore 1621

COUNCIL ON PHARMACY AND CHEMISTRY 1625

EDITORIALS

Procurement and Assignment Service for Physicians, Dentists and Veterinarians 1626

Swine Pox and Vaccinia.....1627

Transfusion of Blood and of Blood Substitutes 1627

CURRENT COMMENT

The Civilian Physician Becomes an Army Officer 1629

Kidney Extracts for Hypertension 1629

BUREAU OF LEGAL MEDICINE AND LEGISLATION 1645

(Subject Index on next page)

MEDICAL PREPAREDNESS

Supply, Procurement and Assignment of Medical Personnel.....1630

ORGANIZATION SECTION

Medical Economic Abstracts....1633

Woman's Auxiliary.....1633

A. M. A. SESSION ATLANTIC CITY JUNE 9-12, 1942

Just Ready!—Steinbrocker's Arthritis

Brand New Book!—With millions of people in the United States having some form of rheumatic disorder, it is easy to understand why the Profession, and especially the General Practitioner, has so insistently demanded a concise, specific and authoritative guide to help solve these important and troublesome problems.

Such a book—such a concise, specific and authoritative guide—is *now ready*. Here is truly a counselor that the physician in general practice, and the specialist too, will find really helpful. Actually Dr. Steinbrocker has made his book *a working manual of today's diagnostic and therapeutic methods.* Proceeding systematically from causes and predisposing factors, he sets down the facts, the procedures, the treatments that are being successfully used today. He includes the latest tests, emphasizes the need for searching and careful examination, includes many helpful differential diagnosis tables, and guides you step-by-step through each stage of treatment and management. He tells just what should be done for the patient in the way of rest, diet and vitamin therapy, constitutional therapy, physical therapy, drug therapy (including the use of the sulfonamides when indicated) use of analgesics, gold therapy, foreign protein and endocrine therapy, etc. He deals extensively with such common phases of arthritic disorders as Painful Shoulder and Low Back Pain, Painful Feet and Posture and its Relation to Arthritis . . . All planned and designed with one common aim—to give the physician seeing these cases the guidance and help he urgently seeks.

By OTTO STEINBROCKER, B.S., M.D., Assistant Attending Physician; Chief, Arthritis Clinic, Bellevue Hospital, Fourth Medical Division, New York City. With Special Chapters by JOHN G. KUHNS, A.B., M.D., F.A.C.S., Chief of Orthopedic and Surgical Service, Robert Breck Brigham Hospital, Boston. 606 pages, 6" x 9", with 324 illustrations. $8.00.

See Also SAUNDERS ADVERTISEMENT on Page 3

SUBJECT INDEX TO THIS ISSUE

The letters used to explain in which department the matter indexed appears are as follows: The Star (*) indicates an Original Article; "ab," abstract; "E," Editorial; "C," Correspondence; "MI," Medicolegal; "ME," Medical Economics; "OS," Organization Section; "SS," Student Section.

Air-borne pathogenic bacteria in operating room *1610
American Film Center, health films....1637
Rheumatism Association proceedings....1646
Anaphylaxis, role of liver in....*1581
Anemia, pernicious, probable....1661
Anesthesia, liver function and....*1580
regional therapeutic *1599
Angina, ferments in urine in, vs. scarlet fever ab-1656
Appendicitis in children....ab-1653
Army, U. S., creates post of Air Surgeon..1632
U. S., medical personnel....E-1626; 1630
Arsphenamine, honor Mrs. Paul Ehrlich....1635
Arthritis, cytology of synovial fluid....ab-1646
dermatitis from gold therapy....1661
menopause, stilbestrol orally for....ab-1650
rheumatoid, fractures in....ab-1649
Asthma, sensitivity to soap....1662
Bacteria, air-borne, in operating room....*1610
Bile secretion *1577
Biliary Tract dyskinesia....ab-1654
Blood disease, role of liver....ab-1648
pressure, high, kidney extracts for....E-1629
pressure, high, magnesium sulfate intravenously lowers ab-1655
pressure, high, potassium thiocyanate for.*1591
prothrombin deficiency in tuberculosis...*1603
thiocyanate determination to control dosage *1591
transfusion of, and substitutes....E-1627
transfusion via bone marrow....ab-1652
Board Examinations 1644
Bone Marrow, infusion via....ab-1652
Book Notices 1657
Books Received ....Adv. page 42
Bowman Gray School opened....1635
Brain, management of palsies....*1621
Brödel, Max, death; portrait....1640
Bronchiectasis, surgical treatment....ab-1652
Bureau of Investigation....1642
Bureau of Legal Medicine and Legislation.1645
Burns, diathermy 1660
Cancer, concentration method of radiotherapy *1607
pain from, nerve blocking for....*1601
Children, genetics of malformations....1662
Choroiditis, macular 1661
Christmas Seal campaign....1637
Colitis, ulcerative 1661
Council on Pharmacy and Chemistry....1625
Council on Physical Therapy....1621
Crockett laboratory for pharmacy....1636
Deafness, osteomyelitic *1619
Deaths 1640
Dental Practice Acts: licenses revoked..MI-1645
Dentists, Office of Procurement and Assignment of E-1626
Dermatitis from gold therapy....1661
Diabetes Mellitus, leg ulcers in....1660
Diarrhea of hyperthyroidism, lipocaic for.ab-1653
Diathermy burns 1660
Diet and the liver....*1579
Diethylstilbestrol 1625
Diphtheria, Manzullo vs. Loeffler test...ab-1655
DuBois, E. F., honored on retirement....1635
Ear, osteomyelitis affecting....*1619
Ehrlich, Mrs. Paul, receives award....1635
Encephalitis, laboratory aids in diagnosis...1631
Endocrines and the liver....*1580
Epilepsy, pregnancy in petit mal....1662
Erythema nodosum, mediastinal and lung changes in ab-1651
Estrogens, "stilbestrol"; "diethylstilbestrol".1625
stilbestrol orally in menopause arthritis.ab-1650
European War, British Pharmacopeia....1638
family physician becomes an army officer E-1629
food situation, England....1638
hospital facilities for Canton of Zurich...1638
medical help for Russia....1638
phosgene poisoning 1638
precaution against air raids....1639
scabies, Danish treatment....1639
Family, order of birth and malformations.1662
Fat metabolism and the fatty liver....*1579
First aid program for civilians....1631
Fluids, infusion via bone marrow....ab-1652
Food situation, England....1638
Foreign Letters 1638
Fractures in chronic arthritis....ab-1649
Gallbladder, disease, surgical management.*1582
Galvanism for hemorrhoids....1660
Gas, war; phosgene....1638
Genetics of malformations....1662
Glaucoma, simple, latest approved treatment.1661
Gold therapy, dermatitis from....1661
Gout, liver etiologic role in....ab-1648
Grant, David N. W., first Air Surgeon....1632
Grenfell, Sir Wilfred, memorial postage stamp 1637
Guedel, Arthur E., Hickman Medal to....1634
Health education, section on films....1637
U. S. P. H. S. supply procurement and assignment of medical personnel....E-1626; 1630
Heart, complications of influenza....1639
Hemoglobin, concentration in blood....ab-1655
Hemoptysis, prothrombin deficiency....*1603
Hemorrhoids, galvanism treatment....1660
Hepatolenticular degeneration *1613
Hodgkin's disease, intrathoracic manifestations ab-1651
Hogs, vaccinia and swine pox....E-1627
Hospital facilities for Canton of Zurich....1638
Hyperthyroidism, lipocaic for diarrhea in.ab-1653
Industrial incidence of coronary thrombosis.1660
Hygiene Foundation of America....1637
medicine and civilian defense....1635
Influenza, cardiac complications....1639
Injections intramedullary ab-1652
Insurance, health, physicians pay in...OS-1633
Kidney extracts for hypertension....E-1629
LaMoure, C. T., hospital supt. 27 years....1634
Larynx cancer, concentration method of radiotherapy *1607
Leg ulcer in diabetes....1660
Library service in general hospital....1632
Lipocaic for diarrhea....ab-1653
Liver, cirrhosis after acute hepatitis....ab-1656
disease in hepatolenticular degenerations.*1613
extract, concentrated, to diagnose pernicious anemia 1661
function and medical progress....*1577
role in blood disease and in gout....ab-1648
Loeffler method in diphtheria diagnosis..ab-1655
Lucchesi reaction in tuberculosis....ab-1655
Lung changes in erythema nodosum....ab-1651
consolidation of right middle lobe....1662
symptoms of lymphomatoid diseases...ab-1651
Lymphoma, intrathoracic signs....ab-1651
mediastinal and pulmonary changes in.ab-1651
Macula choroiditis 1661
Magnesium sulfate, intravenously lowers blood pressure ab-1655
Malformations, genetics of....1662
Manzullo test in diphtheria....ab-1655
Marriages 1639
Mediastinum in erythema nodosum....ab-1651
manifestations of lymphoma....ab-1651
Medical College of Virginia, Crockett laboratory 1636
Medical Economic Abstracts....1633
Medical Education, two day graduate course, Ark. 1634
Medical Examinations and Licensure....1644
Medical Preparedness 1630
Air Surgeon: Col. Grant....1632
first aid for civilian defense....1631
graduation at School of Aviation Medicine 1632
industrial medicine and civilian defense..1635
laboratory aids in neurotropic virus disease 1631
library service for patients in general hospital 1632
medical advisers to Navy....1632
monthly meeting of medical officers....1632
Office of Procurement and Assignment....E-1626; 1630
physical standards under Selective Service Act 1636
rehabilitate those with dental defects....1632
rehabilitation program for youth....1632
Medicolegal Abstracts 1645
Meetings, Coming Meetings....1648
Meningitis, laboratory diagnosis....1631
Menopause arthritis, stilbestrol orally in.ab-1650
Mental Disorders, care of patients....OS-1633
Motion Pictures, films in health education..1637
Mouth cancer, concentration method of radiotherapy *1607
Murphy, Francis D., appointment at Marquette 1637
NYA health program curtailed, O....1636
health service 1632
Navy, U. S., medical personnel...E-1626; 1630
Nerve block, therapeutic....*1599
News 1634
North Pacific Surgical Association....1636
Occupational Therapy in cerebral palsies..*1621
Office of Procurement and Assignment....E1626; 1630
Organization Section 1633
Osteomyelitis causing deafness, etc....*1619
Pain, relief of, by nerve block....*1599
Paralysis, cerebral, management of....*1621
Paraplegia in spinal fractures....*1585
Parotid Gland, disorders....*1594
Peptic Ulcer, incidence....ab-1652
Peritonitis, peptone broth for....ab-1654
Pharmacopeia, British, addendum....1638
Pharynx, cancer, concentration method of radiotherapy *1607
Phosgene poisoning 1638
Physical Examinations: cystoscopic examination; right to compel....MI-1646
Physicians, civilian, become army officers..E-1629
Office of Procurement and Assignment of E-1626; 1630
pay in British health insurance....OS-1633
Poliomyelitis, laboratory diagnosis....1631
report, Canada 1637
research, 1000 monkeys for....1637
situation, U. S....1637
Postage stamp honoring Grenfell....1637
Potassium thiocyanate in hypertension....*1591
Pregnancy in narcolepsy and petit mal....1662
late in life of mother and malformed child.1662
thrombosis during ab-1656
urinary retention in....1662
Prizes, Hickman Medal to Dr. Guedel....1634
Queries and Minor Notes....1660
Radiotherapy, concentration method....*1607
Red Cross, first aid program....1631
Rehabilitation in cerebral palsies....*1621
of those with dental defects....1632
program for youth....1632
Research, scientific, in Switzerland....1638
Rheumatism, American Rheumatism Association proceedings 1646
Rockhill bequest to University of Cincinnati.1635
Russia, medical help to....1638
Salivary gland tumor, mixed....*1596
Scabies, Danish treatment....1639
Scarlet Fever, ferments in urine....ab-1656
"Schering" now entirely British....1638
Scurvy, experimental ab-1656
Sleep, pregnancy in narcolepsy and petit mal.1662
Soap, sensitivity to....1662
Society Proceedings 1646
Spinal Cord injury in spine fracture....*1585
Spine, fractures *1585
State Board Examinations....1644
Sterilization of air with ultraviolet rays...*1610
Stilbestrol 1625
Streptococci, hemolytic, ferments in urine decompose ab-1656
Sulfaguanidine for ulcerative colitis....1661
Sulfanilamide implanted in wounds....ab-1653
Surgery, operating room, air-borne pathogenic bacteria in....*1610
North Pacific Surgical Association....1636
Swine pox and vaccinia....E-1627
Switzerland, scientific research in....1638
Synovial Fluid, supravital staining in arthritis ab-1646
Testis, undescended, in 11 year old....1662
Thiocyanates, further experiences....*1591
Thorax, symptoms of lymphomatoid diseases ab-1651
Thrombosis, coronary, occupational incidence.1660
venous, in pregnancy ab-1656
Tinnitus, osteomyelitic *1619
Tonics and Sedatives....Adv. page 34
Tuberculosis, Christmas Seal....1637
diagnosis, Lucchesi reaction....ab-1655
pulmonary, cavities, complications in Monaldi's drainage ab-1656
pulmonary, prothrombin deficiency in hemoptysis *1603
Typhoid, health department's records of carrier MI-1645
Ulcers of leg in diabetes....1660
Ultraviolet Rays, sterilization of air with.*1610
Underprivileged, service for....1636
University of Cincinnati, Rockhill trust fund.1635
Urine, ferments decompose streptococci..ab-1656
retention in pregnancy....1662
Uterus, ruptured ab-1654
Vaccinia and swine pox....E-1627
Vertigo, osteomyelitic *1619
Veterinarians, Office of Procurement and Assignment of E-1626
Virus diseases, neurotropic, laboratory aids in 1631
Vital Statistics of Switzerland....1639
Vitamins K and the liver....*1580
Woman's Auxiliary 1633
Wounds, infected operative, sterilize air with ultraviolet rays to prevent....*1610
operative, sulfanilamide implanted in..ab-1653

THE JOURNAL of the American Medical Association is published weekly by the American Medical Association, 535 North Dearborn Street, Chicago, Ill. Subscription price, $8.00 a year. 25c a copy. Canadian $9.50. Foreign $12.00. Entered as second class matter June 25, 1885, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

BOOK BUYING SIMPLIFIED We supply new and standard medical works of all publishers
ONE ORDER—ONE REMITTANCE
GET OUR LATEST BULLETIN **CHICAGO MEDICAL BOOK CO.** 458 S. Honore St. CHICAGO

The Journal of the American Medical Association

Published Under the Auspices of the Board of Trustees

VOL. 117, NO. 19 — COPYRIGHT, 1941, BY AMERICAN MEDICAL ASSOCIATION CHICAGO, ILLINOIS — NOVEMBER 8, 1941

THE LIVER AND MEDICAL PROGRESS

FRANK C. MANN, M.D.

ROCHESTER, MINN.

It is an essential but almost impossible task for the physician to keep himself sufficiently informed concerning the discoveries in the several sciences that are included in the science of medicine to use intelligently the practical results of these discoveries in his clinical work. From the biologic, chemical and physical laboratories in addition to the research clinic and bedside of the patient there issues a flood of discoveries which is almost overwhelming. If the physician is to render to his patient of today the benefit of the discovery of yesterday, the new accretions to the knowledge and practice of medicine must be evaluated, organized and assimilated within the background of his previous training and experiences. His ability to apply the results of the investigations in the various fields of medicine will depend on his knowledge of the fundamental sciences and the advances made in them as well as on his clinical training and acumen.

The following brief review of some of the functions of the liver has been prepared in conformity with the foregoing considerations. The liver has many functions, and hepatic activity is a part of a large number of the important physiologic processes occurring in the body. Because of these manifold activities the liver is involved in a considerable number of the discoveries which constitute the substance on which the practice of medicine progresses. Accordingly an attempt is made to achieve a dual purpose in this paper: (1) to present the more significant functions of the liver and (2) to emphasize the important role of the liver in medical science by citation of some recent advances in diverse fields directly or indirectly related to the organ. No attempt is made to present a complete review of the available material in regard to either objective, and the subject is too broad in relation to space to permit citation of more than the more pertinent references.

PHYSIOLOGIC ANATOMY

While the anatomy of the liver is too well known to deserve comment, four anatomic characteristics should be noted because they are pertinent to a discussion of the functions of the organ: 1. The liver is the largest organ in the body. 2. The organ has a dual blood supply, one arterial and the other venous. 3. Cytologically the organ contains predominantly two cell types, the hepatic cell and the stellate cell, which have separate functions. 4. Histologically the hepatic tissue is composed of units organized to favor an especially intimate relationship between the parenchymal cells and a generous supply of blood and to supply a duct system adequate to accommodate the secretion of bile.

From the Division of Experimental Medicine, Mayo Foundation.

Read before the Section on Pathology and Physiology at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 4, 1941.

MAINTENANCE OF THE AMOUNT OF HEPATIC TISSUE

The liver has several general characteristics which are important in relation to its functional activities, but only one of these will be emphasized. The organ possesses an astounding capacity for restoration after injury or loss of a portion. This characteristic of hepatic tissue becomes increasingly significant in relation to the growing knowledge concerning the pathologic reactions occurring in the organ. Many of the changes noted in pathologic conditions of the liver and the persistence of functioning hepatic tissue in opposition to exceedingly adverse conditions are due to this almost irresistible urge of the hepatic tissue to be restored.

FUNCTIONS OF THE LIVER

The more important of the known physiologic activities of the liver are outlined as follows:

Secretion of Bile.—The secretion of the liver, bile, is normally formed continuously, but the rate of secretion may be accelerated by physiologic stimulants, such as certain foods and notably the bile acids. Bile contains several substances, of which four, water, bile pigment, bile salts and cholesterol, are found in the largest amounts. Bile pigment is made from hemoglobin (blood and muscle) by the reticuloendothelial cells located throughout the body but mainly in spleen, bone marrow and liver and, under normal conditions, is excreted through the intestine as a waste product. Bile salts are formed in the liver and, under certain conditions, appear to be destroyed in the organ. Cholesterol, the substance most commonly found in diseases of the biliary tract, is a physiologic enigma in regard to its secretion by the liver and presence in the bile. Besides being the medium for the excretion of bile pigment, bile has important functions in relation to digestion. It is one of the secretions which serve to dilute, buffer and neutralize the acidity of the gastric contents which reach the duodenum. The bile salts are important for the normal digestion and absorption of fat and are especially valuable in the absorption of the fat-soluble vitamins.

Hepatic Activities in Relation to the Foodstuffs.—Hepatic activities in relation to the foodstuffs appear to begin immediately after the ingestion of food. Not

only does the liver exhibit gross changes such as relate to size and color, but more careful observation indicates that it undergoes a definite diurnal cycle in regard to size and weight which appears to depend on the food products reaching it and is due mainly to variations in its content of water and glycogen and possibly fat and protein.

The liver has three major activities in relation to the utilization of food, which are (1) storage of foodstuffs, (2) manufacture of food materials and (3) regulation of the latter. Carbohydrate in the form of glycogen and fat in various forms can be stored in the organ in relatively large amounts up to 20 per cent of glycogen and 40 per cent of fat. Some evidence would indicate that a storage form of protein also exists in the hepatic cells. Certain sugars and possibly some substances originating from fat are converted by the liver from a nonutilizable form to one that can be used by the tissues. Amino acids are deaminized by the liver, and the nitrogenous portion is converted into urea by the hepatic cells. The organ has a vital function in the regulation of the dextrose content of the blood and may possibly be of significance in regard to control of the supply of protein and fat to the tissues by mobilization of its content of these two materials.

Storage.—The relatively large amount of hepatic tissue has been considered as indicative of the great capacity of the liver for storage, and evidence would suggest that this function of the organ has not been overemphasized. In addition to the storage of foodstuffs, the hepatic cells are the site of storage for many other important substances such as certain vitamins and the factor essential in the treatment of pernicious anemia. Several metals, notably iron, are retained in the liver, mainly within the reticuloendothelial cells.

Synthesis.—The liver appears to be the site of origin for several important physiologic substances. Among these should be mentioned heparin, the plasma proteins and some of the essential factors for the coagulation of the blood, such as fibrinogen or its precursor and prothrombin.

Detoxicating Function.—While the detoxicating function of the liver may have been overemphasized in the past, there appears to be no question in regard to hepatic activity protecting the organism from some harmful substances which may originate within the body or reach the blood stream from the outside. Certain alkaloids such as strychnine and nicotine are for the most part destroyed in the liver. Many substances are made innocuous by conjugation, a process which appears in many instances to occur in the liver. The organ may protect the body from toxic substances in other ways than by actual destruction. Some such substances are excreted in the bile; others may be held temporarily in the hepatic cells and released in amounts too small to be injurious to other more vulnerable sites of action.

From the preceding review of hepatic activities, even though brief and incomplete, it is clearly evident that the liver has a part in a large number of physiologic processes. It is also apparent that the practice of medicine requires an awareness of the liver and that the possibility of a hepatic factor in the newer phases of medical science must always be considered. A few illustrative examples can be cited.

SOME RECENT ADVANCES CONCERNING THE LIVER AS AN ORGAN

Circulation and Flow of Blood.—The unique circulation of the liver is one of the important factors conditioning the character and capacity of the functional activities of the organ. Several investigations on the hepatic circulation have been made in this laboratory, of which a few will be mentioned.

The Circulation in Relation to Hepatic Restoration.—The partial removal of the liver is followed by complete restoration of hepatic tissue within a fairly definite period. It has been proved that this hepatic restoration depends almost completely on the supply of portal blood to the organ because it occurs to only a slight extent when this portion of the hepatic circulation has been diverted from passing through the organ.[1] Evidence indicates that restoration of liver tissue after hepatic injury also depends to a considerable extent on the portal blood flow.

The Intrahepatic Circulation of Blood.—As previously mentioned, the liver differs in one important respect from all other organs of the body; namely, it possesses both an arterial and a venous supply of blood. The intrahepatic course of these two sources of blood, their relative functions in relation to the hepatic cell, and where they join to enter the common channel, the central vein of the lobule, have been significant but unanswered questions. The investigations of Wakim[2] have answered some of these questions. Using a modification of the transillumination method of Knisely,[3] he studied the intrahepatic circulation of blood in the frog and the rat. He observed that the intrahepatic circulation is intermittent, with phases of circulatory activity in the sinusoids alternating irregularly with phases of inactivity. During circulatory inactivity the sinusoids may either go through a storage phase during which they are packed full of blood cells or go through a nonstorage phase during which they contain very few blood cells. The liver normally possesses a high circulatory functional reserve. Arteriovenous anastomoses were found between the branches of the hepatic artery and portal vein. The hepatic artery was found to supply arterial blood to the hepatic parenchyma through several routes: (1) arterial terminals emptying directly into the sinusoids, (2) arterial branches emptying into the radicles of the portal vein proximal to the sinusoids and (3) arteriovenous anastomosis between the two vessels proximal to the sinusoids. Almost all the hepatic parenchyma was supplied with blood from the portal vein, but some regions appeared to have only an arterial supply. These observations on the intrahepatic circulation give promise of being of aid in determining the specific localization of sites of injury caused by some hepatic toxins.

The Liver as a Storage Reservoir for Blood.—The relatively large capacity of the sinusoids of the liver as well as the results of studies on changes in volume of the organ suggests the possibility that the liver may be an important site for storage of blood. The results of some studies by Grindlay, Herrick and me[4] on the flow of

1. Mann, F. C.: The Portal Circulation and Restoration of the Liver After Partial Removal, Surgery. **8**: 225-238 (Aug.) 1940.
2. Wakim, K. G.: The Intrahepatic Circulation of Blood in the Intact Animal: Preliminary Report, Proc. Staff Meet., Mayo Clin. **16**: 198 (March 26) 1941.
3. Knisely, M. H.: A Method of Illuminating Living Structures for Microscopic Study, Anat. Rec. **64**: 499-524 (March) 1936.
4. Grindlay, J. H.; Herrick, J. F., and Mann, F. C.: Measurement of the Blood Flow of the Liver, Am. J. Physiol. **132**: 489-496 (March) 1941.

blood to the liver furnish additional evidence for this view. We measured the flow of blood to and from the liver simultaneously by means of the thermostromuhr and obtained data which indicated that under certain conditions the liver may alternately store blood and discharge stored blood.

The Secretion of Bile.—The most important recent additions to knowledge concerning the secretion of bile have been made by Ivy and his co-workers.[5] It is unnecessary to review the results of their studies, as Ivy is presenting some of them at this symposium. It should be emphasized that the importance of the clinical conditions associated with impairment of this function of the liver makes continued investigation on it desirable.

INVESTIGATIONS DEALING WITH PHYSIOLOGIC RELATIONSHIPS BETWEEN THE LIVER AND OTHER PARTS OF THE BODY

Diet and the Liver.—The role of the liver in regard to the storage, manufacture and regulation of the food supply to the body makes imperative a close relation between hepatic activity and the character of the food intake. Recent work on this subject has been reviewed by Hawkins.[6] It would appear desirable for the physician to consider diet in relation to the liver from two points of view: (1) the character of the food that will be most suitable for protecting the organ from stress and (2) the diet that will permit the impaired liver to maintain its function most efficiently. While the results of investigations are not wholly in agreement, it would appear that the liver is best prepared to meet stress when its store of both carbohydrate and protein is ample. The impaired liver appears to function best on a high carbohydrate diet with sufficient protein obtained from simple foods to maintain the requirements of the body for this foodstuff as well as to supply the organ with sufficient amounts for the synthesis of the specific products it elaborates. The results of most investigators are in agreement in one respect: a diet which tends to increase excessively the fat content of the liver is detrimental.

Fat Metabolism and the Fatty Liver.—Knowledge concerning the processes of carbohydrate and protein metabolism has greatly exceeded that in regard to the metabolism of fat. However, owing to the development of more satisfactory chemical methods for the investigation of fat metabolism, data are rapidly accumulating in regard to the utilization of this important foodstuff, and such data would seem to indicate that the liver is important in the metabolism of fat as well as of carbohydrate and protein. Investigations made with this point in view have been done by Dr. Bollman and Dr. Flock in this laboratory. A brief review of the data on this subject, gathered from the results of many investigators, although at present rather confusing, serves to emphasize the role of the liver in relation to fat metabolism.

The ability of the liver to hold widely varying quantities of fat is one of the most striking characteristics of this organ. The concentration of lipids present in the liver at any given time appears to be the resultant of the influences of many different factors: species of animal, type of diet including vitamin content, hormones and toxic substances.

The concentration of neutral fat in the liver may increase after the administration of many toxic substances, such as chloroform, carbon tetrachloride or phosphorus, which injure the liver cells. Feeding of a high fat diet to mammals results in the storage of an unusually large amount of fat in the liver. Forced feeding of a high carbohydrate diet to birds, such as the goose, results in synthesis and storage of large amounts of liver fat.[7] Fasting, or feeding of the amino acid cystine, will produce fatty livers. McHenry and his co-workers[8] have recently shown that vitamins B_1, B_6 and H will increase liver fat in the rat under certain experimental conditions. Thus thiamine or vitamin B_1 administered to rats on a high carbohydrate diet produces an increase apparently due to synthesis of fat from carbohydrate. Pyridoxine or vitamin B_6 as well as thiamine is essential for the synthesis of fat in rats on a high protein diet. Biotin or vitamin H is effective in increasing the amount of liver fat in rats on a low choline, fat-free diet. A hormone in anterior pituitary extracts will produce fatty livers in many animals, whereas the absence of insulin and other constituents of the pancreas produces fatty livers in depancreatized animals. Estrogenic substances will produce very fatty livers in birds.

Substances that will produce a decrease in the neutral fat content of liver under definite experimental conditions are choline, the amino acid methionine, carbohydrate, protein, insulin and other constituents of the pancreas. Choline, methionine, carbohydrate or protein prevents the accumulation of fat due to a high fat diet. Fatty livers which develop in depancreatized dogs maintained with insulin are prevented by choline[9] or by lipocaic,[10] a water-soluble substance of pancreas. Montgomery, Entenmen, Chaikoff and Nelson[11] reported that fatty livers may be prevented in dogs with complete ligation of the pancreatic ducts by feeding of pancreatic juice as well as an extract of pancreas. Fatty livers produced by anterior pituitary extract cannot be prevented by either choline or lipocaic.[12] Fatty livers produced by biotin are prevented by lipocaic but not by choline.

The concentration of cholesterol in the liver tends to vary in the same direction as that of neutral fat under the foregoing conditions but to a smaller degree. Feeding of cholesterol to rabbits, guinea pigs or rats will produce fatty livers in which cholesterol is the predominant lipid.[13]

5. Kocour, E. J., and Ivy, A. C.: The Effect of Certain Foods on Bile Volume Output Recorded in the Dog by a Quantitative Method, Am. J. Physiol. **122:** 325-346 (May) 1938.

6. Hawkins, W. B.: Liver and Bile, Ann. Rev. Physiol. **3:** 259-282, 1941.

7. Flock, Eunice V.; Bollman, J. L.; Hester, H. R., and Mann, F. C.: Fatty Liver in the Goose Produced by Overfeeding, J. Biol. Chem. **121:** 117-129 (Oct.) 1937.

8. McHenry, E. W., and Gavin, Gertrude: The Effect of Several B Vitamins and of Choline upon Liver and Body Fat, J. Biol. Chem. **128:** lxvi (June) 1939; The B Vitamins and Fat Metabolism: IV. The Synthesis of Fat from Protein, ibid. **138:** 471-475 (April) 1941; The Effect of Biotin upon the Synthesis of Lipids in Rats, Proc. Am. Soc. Biol. Chem., 1941, p. lxxxvii.

9. Best, C. H.; Ferguson, G. C., and Hershey, J. M.: Choline and Liver Fat in Diabetic Dogs, J. Physiol. **79:** 94-102 (July 28) 1933.

10. Dragstedt, L. R.; Van Prohaska, John, and Harms, H. P.: Observations on a Substance in Pancreas (a Fat Metabolizing Hormone) Which Permits Survival and Prevents Liver Changes in Depancreatized Dogs, Am. J. Physiol. **117:** 175-181 (Sept.) 1936.

11. Montgomery, M. L.: Entenmen, C.; Chaikoff, I. L., and Nelson, C.: The Role of the External Secretion of the Pancreas in Lipid Metabolism: The Prevention of Fatty Livers in Depancreatized and Duct-Ligated Dogs by the Daily Feeding of Fresh Pancreatic Juice, J. Biol. Chem. **137:** 693-698 (Feb.) 1941.

12. Mackay, E. M., and Barnes, R. H.: Choline and Pancreas Extract on Fatty Livers and Ketosis Due to Anterior Pituitary Extract, Proc. Soc. Exper. Biol. & Med. **38:** 803-805 (June) 1938.

13. Cook, R. P., and McCullagh, G. P.: A Comparative Study of Cholesterol Metabolism and Its Relation to Fatty Infiltration, with Particular Reference to Experimental Cholesterol Atheroma, Quart. J. Exper. Physiol. **29:** 283-302 (Aug.) 1939.

The total amount of phospholipid in the liver tends to remain relatively constant, although the percentage concentration decreases in the very fatty livers owing to dilution of the liver tissue with neutral fat. The studies of Hevesy and others involving the use of the radioactive isotope of phosphorus indicate that phospholipid turnover in the liver is increased after fat feeding.[14] Experiments by Perlman and Chaikoff[15] demonstrate a definite acceleration in this turnover when choline is fed and a decrease in turnover when cholesterol is fed. Recent experiments by Flock and Bollman[16] suggest that a decided shift in relative amounts of lecithin and cephaline may occur in very fatty liver produced by stilbestrol in birds.

A few tentative conclusions may be made, based on the large but as yet inadequate amount of data concerning the role of the liver in fat metabolism: 1. Many widely different factors can cause great changes in the amount and kind of fat content of the liver. 2. Such changes can occur with great rapidity. 3. Any considerable increase in the fat content of the liver, even an increase produced by physiologic means, impairs the organ in regard to some of its other functions.

Vitamins and the Liver.—There is only suggestive evidence that there is a direct and specific effect of any vitamin deficiency on the liver as an organ. The changes observed can all be produced by reducing food intake, so that it would appear that they are due to anorexia following vitamin deficiency rather than to vitamin lack per se. On the other hand the liver does have an important role in regard to several vitamins, and specific vitamin deficiencies may affect some of its functions. As would be anticipated, its major role appears to be that of storage, and many of the vitamins are found in relatively large amounts in the organ. It also seems to be the site where some of the vitamins produce part of their effects, as was noted in the discussion of fat metabolism.

The intimate relationship of hepatic activity to seemingly extrahepatic processes is illustrated by a brief review of the role of the organ in the utilization of vitamin K.

The chemistry and physiology of vitamin K have recently been reviewed by Almquist[17] and its clinical use has been reviewed by Quick,[18] Snell and Butt,[19] Dam[20] and Ferguson.[21] Vitamin K deficiency in chicks was shown to produce hemorrhage in these animals because of a much reduced level of prothrombin in the blood. Other animals were more resistant to the effects of dietary vitamin K deprivation, but later work has demonstrated prothrombin deficiencies clearly due to dietary K avitaminosis in a number of species of mammals. The relation of the liver to vitamin K was indicated by the prothrombin deficiency in rats, dogs and man deprived of bile by fistula or by biliary obstruction. This relationship depended on the necessity of bile in the gastrointestinal tract for the absorption of the vitamin contained in food or of vitamin concentrates. The feeding of bile or bile salts with diets containing vitamin K was sufficient to relieve the hypoprothrombinemia. Certain synthetic water-soluble vitamin K compounds are efficiently absorbed and are effective in the absence of bile from the intestine.

Severe hepatic damage is usually associated with hypoprothrombinemia. In chloroform[22] and carbon tetrachloride[23] injury to the liver, the hypoprothrombinemia is not altered by administration of large amounts of vitamin K. The severely damaged liver seems unable to maintain the prothrombin level of the blood even when vitamin K is available. The loss of prothrombin from the blood that occurs after removal of the liver is likewise uninfluenced by the administration of vitamin K.[24] From the data available it may be concluded that the liver is responsible for the formation of prothrombin and that prothrombin formation may be prevented either by injury to the liver or by deficiency of vitamin K.

The Liver and the Endocrines.—Hepatic activity appears to be altered, either directly or indirectly, by many of the hormones. However, the amount of data on this subject is too large to review and the character of the data too difficult to evaluate in the allotted space. Suffice to repeat the statement made in a previous paper:[25] "Hepatic activity can be changed by hormones in the following respects: (1) by an effect on the rate of body metabolism, (2) by an effect on the intrinsic mechanism of the liver, either for storage or manufacture of food, and (3) by an effect on the amount of available food materials reaching the liver." Evidence is accumulating which indicates that the functions of the liver may be altered by different hormones in each of the respects mentioned.

Hepatic Function in Relation to Anesthesia.—It has been recognized for many years that certain anesthetic agents, notably chloroform, produce injury to the liver but the subject seemed to be of sufficient current interest for a recent reviewer of hepatic function to reemphasize it.[6] It is not so well known that the liver may be an important site for the destruction of some anesthetic substances. For example, it has been shown that the liver detoxicates procaine much more rapidly and efficiently than do other tissues.[26]

An ingenious method for investigating the question of whether or not anesthetic agents are destroyed or prevented from acting by the liver has been devised by Scheifley and Higgins,[27] using the partially hepatectomized rat as a test object. It had been found that restoration of the liver of the rat after partial removal

14. Artom, C.; Sarzana, G.; Perrier, C.; Santangelo, M., and Segre, E.: Phospholipid Synthesis During Fat Absorption, Nature. **139:** 1105-1106 (June 26) 1937. Perlman, I.; Ruben, S., and Chaikoff, I. L.: Radioactive Phosphorus as an Indicator of Phospholipid Metabolism: I. The Rate of Formation and Destruction of Phospholipids in the Fasting Rat, J. Biol. Chem. **122:** 169-182 (Dec.) 1937.

15. Perlman, I., and Chaikoff, I. L.: Radioactive Phosphorus as an Indicator of Phospholipid Metabolism: V. On the Mechanism of the Action of Choline upon the Liver of the Fat-Fed Rat, J. Biol. Chem. **127:** 211-220 (Jan.) 1939; Radioactive Phosphorus as an Indicator of Phospholipid Metabolism: VII. The Influence of Cholesterol upon Phospholipid Turnover in the Liver, ibid. **128:** 735-743 (June) 1939.

16. Flock, Eunice V., and Bollman, J. L.: Unpublished data.

17. Almquist, H. J.: Vitamin K, Physiol. Rev. **21:** 194-216 (Jan.) 1941.

18. Quick, A. J.: A Classification of Hemorrhagic Diseases Due to Defects in the Coagulation Mechanism of the Blood, Am. J. M. Sc. **199:** 118-132 (Jan.) 1940.

19. Snell, A. M., and Butt, H. R.: Supplementary Report on Vitamin K, J. A. M. A. **113:** 2056-2059 (Dec. 2) 1939.

20. Dam, H.: Fat-Soluble Vitamins, Ann. Rev. Biochem. **9:** 353-382, 1940.

21. Ferguson, J. H.: Blood, Coagulation, Biophysical Characters and Formed Elements, Ann. Rev. Physiol. **2:** 71-108, 1940.

22. Smith, H. P.; Warner, E. D., and Brinkhous, K. M.: Prothrombin Deficiency and the Bleeding Tendency in Liver Injury (Chloroform Intoxication), J. Exper. Med. **66:** 801-811 (Dec.) 1937. Brinkhous, K. M., and Warner, E. D.: Effect of Vitamin K on Hypoprothrombinemia of Experimental Liver Injury, Proc. Soc. Exper. Biol. & Med. **44:** 609-610 (June) 1940.

23. Bollman, J. L.; Butt, H. R., and Snell, A. M.: The Influence of the Liver on the Utilization of Vitamin K, J. A. M. A. **115:** 1087-1090 (Sept. 28) 1940.

24. Andrus, W. DeW.; Lord, J. W., Jr., and Moore, R. A.: The Effect of Hepatectomy on the Plasma Prothrombin and the Utilization of Vitamin K, Surgery, **6:** 899-900 (Dec.) 1939.

25. Mann, F. C.: The Role of the Liver as the Commissariat of the Body, Am. J. Digest. Dis. & Nutrition **4:** 355-364 (Aug.) 1937.

26. Dunlop, J. G.: The Fate of Procaine in the Dog, J. Pharmacol. & Exper. Therap. **55:** 464-481 (Dec.) 1935.

27. Scheifley, C. H., and Higgins, G. M.: The Effect of Partial Hepatectomy on the Action of Certain Barbiturates and a Phenylurea Derivative, Am. J. M. Sc. **200:** 264-268 (Aug.) 1940.

of the organ (approximately 70 per cent) began toward the end of the first twenty-four hours and that the remainder more than doubled itself in seventy-two hours with complete restoration of the ratio of liver weight to body weight by ten to fourteen days. If the liver protects the body against any particular substance, a removal of a portion of the organ should increase the action of the substance and, conversely, restoration of the liver should cause a corresponding decrease in its effect.

Employing a standard method of procedure in regard to dosage, method of administration and time of administration after operation, Scheifley and Higgins found that the duration of anesthesia produced by pentobarbital sodium was definitely prolonged after partial removal of the liver and decreased as the organ was restored. The action of pentothal sodium was not altered by the loss of hepatic tissue. The results of these experiments indicate that the liver protects the body against the action of pentobarbital sodium but does not protect against the action of pentothal sodium. The clinical application of results of investigations such as the foregoing from the standpoint of both the anesthetist and the surgeon has recently been briefly but pertinently reviewed by Lundy and his associates.[28]

The Role of the Liver in Anaphylaxis.—Since anaphylactic shock was first observed, investigators have searched for the mechanism by which the symptoms of the reaction are produced. Pioneer investigators[29] of the problem noted the two most outstanding features of anaphylactic shock in the dog, namely the fall in blood pressure and the reduced coagulability of the blood, and suggested that the fall in blood pressure might be due to the liberation of a tonic substance. In the dog, the liver was soon implicated as a possible source of the tonic substance. It was found, by cross circulation methods, that when a normal dog was given blood from an anaphylactic animal signs of anaphylaxis[30] developed and that exclusion of the liver from the circulation in a sensitized dog prevented the usual anaphylactic reaction when the antigen was administered.[31] The importance of the presence of the liver in anaphylactic shock in the dog was corroborated and emphasized by the studies of several investigators.[32] It became clear that during anaphylactic shock in the dog the liver became greatly congested and that the blood leaving the liver possessed blood pressure lowering properties. Waters and Markowitz[33] recently found in acute experiments in which the animal was under ether anesthesia that sensitized dogs show a fall in blood pressure after injection of antigen, even when the liver has been removed.

The problem was considerably clarified by the demonstration that histamine or a histamine-like substance is present in the blood of the dog during anaphylactic shock. First, Dragstedt and his co-workers[34] showed very clearly that a vasoactive substance was present in high concentrations in blood taken from the supradiaphragmatic portion of the inferior vena cava. They seldom found this activity in the more peripheral blood. Anatomically their studies indicated the liver as a likely source of the active substance. Extensive investigations of the properties of the active substance allowed them to conclude that it was histamine. More recently Code,[35] using a quantitative method of estimation, found that histamine is liberated into the blood stream in relatively high concentrations during acute anaphylactic reactions in the dog and the guinea pig. Using the same method, Ojers, Holmes and Dragstedt[36] found that in the dog the histamine content of the liver is reduced during anaphylactic shock. The balance of evidence to date suggests that much of the histamine liberated into the blood during anaphylaxis in the dog comes from the liver. No such decisive evidence in respect to the importance of the role of the liver during anaphylaxis has been advanced for other animal species.

While the increased concentration of histamine found in the blood during anaphylactic shock in the dog readily explains the fall in blood pressure which occurs during the reaction, it does not solve the problem of the decreased coagulability of the blood. In their early work Biedl and Kraus had pointed out this important change, and one of the early stumbling blocks in the histamine hypothesis of anaphylactic shock was the fact that histamine itself has no effect on blood coagulability. The reduced coagulability of the blood has been shown by Jaques and Waters[37] to be due to a liberation of heparin into the blood stream, and this presumably is derived from the liver.

Liver Function Tests.—A discussion of functional tests of the liver does not come within the scope of this paper, but since all such tests should have a basis on established physiologic function a few brief statements of physiologic consideration in regard to functional tests may be of value. In this connection it should be emphasized that the liver is a very dynamic organ, and both the character of its function and the capacity for any particular function vary greatly within relatively short intervals of time. It should also be noted that there is a dissociation of function of the liver, so that injury may impair one function to a greater extent than other functions. Normal physiologic conditions may impair some of the hepatic functions, as was previously noted in regard to a fat diet producing an increase in fat content of the liver and a decrease in some hepatic functions. Hepatic injury may be followed by restoration of hepatic tissues without apparent loss of hepatic function. Only a small amount of normal hepatic tissue may maintain normal hepatic activities under protection from functional stress.

28. Lundy, J. S.; Tuohy, E. B.; Adams, R. C., and Mousel, L. H.: Clinical Use of Local and Intravenous Anesthetic Agents: General Anesthesia from the Standpoint of Hepatic Function, Proc. Staff Meet., Mayo Clin. **16:** 78-80 (Jan. 29) 1941.

29. Biedl, A., and Kraus, R.: Experimentelle Studien über Anaphylaxie, Wien. klin. Wchnschr. **22:** 363-370 (March 18) 1909.

30. Manwaring, W. H.: Serophysiologische Untersuchungen: 1. Der physiologische Mechanismus des anaphylaktischen Shocks, Ztschr. f. Immunitätsforsch. u. exper. Therap. **8:** 1-24 (Nov. 7) 1910.

31. Manwaring, W. H.; Hosepian, V. M.; O'Neill, F. I., and Moy, H. B.: Hepatic Reactions in Anaphylaxis: X. The Hepatic Anaphylatoxin, J. Immunol. **10:** 575-581 (May) 1925.

32. Voegtlin, Carl, and Bernheim, B. M.: The Liver in Its Relation to Anaphylactic Shock, J. Pharmacol. & Exper. Therap. **2:** 507-511 (July) 1911. Denecke, Gerhard: Ueber die Bedeutung der Leber für die anaphylaktische Reaktion beim Hunde, Ztschr. f. Immunitätsforsch. **20:** 501-520 (Jan. 22) 1914. Weil, Richard: Studies in Anaphylaxis: XXI. Anaphylaxis in Dogs: A Study of the Liver in Shock and in Peptone Poisoning, J. Immunol. **2:** 525-556 (Oct.) 1917.

33. Waters, E. T., and Markowitz, J.: Typical Anaphylaxis in the Dog in the Absence of the Liver, Am. J. Physiol. **130:** 379-383 (Aug.) 1940.

34. Dragstedt, C. A., and Gebauer-Fuelnegg, Erich: Studies in Anaphylaxis: I. The Appearance of a Physiologically Active Substance During Anaphylactic Shock, Am. J. Physiol. **102:** 512-519 (Nov.) 1932. Gebauer-Fuelnegg, Erich, and Dragstedt, C. A.: Studies in Anaphylaxis. II. The Nature of a Physiologically Active Substance Appearing During Anaphylactic Shock, ibid. **102:** 520-526 (Nov.) 1932. Dragstedt, C. A., and Mead, F. B.: Further Observations on the Nature of the Active Substance ("Anaphylotoxin") in Canine Anaphylactic Shock, J. Immunol. **30:** 319-326 (April) 1936.

35. Code, C. F.: The Histamine Content of the Blood of Guinea Pigs and Dogs During Anaphylactic Shock, Am. J. Physiol. **127:** 78-93 (Aug.) 1939.

36. Ojers, Gaylor; Holmes, C. A., and Dragstedt, C. A.: The Liver Histamine in Canine Anaphylaxis, read before the American Society for Pharmacology and Experimental Therapeutics, Chicago, April 15, 1941.

37. Jaques, L. B., and Waters, E. T.: The Isolation of Crystalline Heparin from the Blood of Dogs in Anaphylactic Shock, Am. J. Physiol. **129:** P389-P390 (May) 1940.

CONCLUSION

From the foregoing statements regarding hepatic activity it would appear from a physiologic point of view that the results of functional tests may vary in relation to tissues and that such slight variation in procedure as changes in diet and length of fast preceding test may alter the results of the test. One test may show a normal function, while another would indicate impairment of function. It is possible that only a test which placed considerable physiologic stress on the organ would indicate impairment of function even though the organ might be badly injured.

SURGICAL MANAGEMENT OF DISEASE OF THE GALLBLADDER

AS CORRELATED WITH NEWER PHYSIOLOGIC CONCEPTS

LEON GOLDMAN, M.D.
AND
H. GLENN BELL, M.D.
SAN FRANCISCO

The application of physiologic principles in the management of patients with disease of the gallbladder has affected the preoperative and postoperative care, mortality and general end results. During the past ten years these advances have caused us to change or to augment, from time to time, our existing management of surgical patients with disease of the biliary tract.

PREOPERATIVE AND POSTOPERATIVE CARE OF THE POOR RISK PATIENT

While patients with simple uncomplicated disease of the gallbladder without ductal or hepatic involvement may require but little preparation for surgery, those with long-standing disease of the gallbladder, jaundice or a history of jaundice or recurrent infection or obstruction of the biliary tract or liver will require time for surgical preparation. Tests of hepatic function, such as the test with hippuric acid,[1] the rose bengal [2] or the galactose tolerance test,[3] should be carried out repeatedly on all patients who are poor surgical risks. Ravdin [4] and Althausen [5] pointed out that a high carbohydrate, low fat diet, adequate in proteins, may be efficacious in protecting the integrity of the hepatic cells, while a high concentration of hepatic lipids predisposes to cellular necrosis. The correction of vitamin deficiencies is particularly important, as it has been shown that the storage of vitamins in the liver is affected by the presence of hepatic damage.[6] Deficiencies of vitamins B and C are common in all surgical patients.[7] Vitamin B_1, thiamine hydrochloride, may be rapidly destroyed in the presence of an injured liver and yet is necessary for the utilization of carbohydrates.[8] Bile salts are essential for the intestinal absorption of the fat soluble vitamins A, D, E and K from the diet. They also are necessary to promote secretion of bile by the liver, enhance absorption of iron and calcium and augment peristaltic activity.[9] In the presence of external biliary fistula or obstructive jaundice, natural bile salts should be used for absorptive purposes. Under these circumstances the liver is able to secrete bile pigment, though it is not capable of excreting bile salts. After complete obstruction of the common bile duct or an external biliary fistula has been present for from ten days to two weeks, the bile will contain little or no bile salts.[10] Rather than refeed the patients their own bile, which is a disagreeable procedure and of little benefit, one should administer those natural bile salts which promote the intestinal absorption of fats, such as desoxycholic acid, bilron, desicol, bilein or degalol. The choleretic action of bile salts following surgery of the common duct may be of value in flushing the extraheptatic bile ducts of débris, clots, small precipitates or even small calculi.[11] The hydrocholeretic activity of oxidized unconjugated dehydrocholic or ketocholanic acids, as decholin, procholon or ketochol, increases the volume, thins the bile and has the least toxic effect.[12] The prothrombin level in the blood should be determined for all patients who are poor surgical risks, in an attempt to recognize the hemorrhagic tendency,[13] which should be combated by the oral administration of natural [14] or intravenous use of synthetic vitamin K preparations [15] (naphthoquinone derivatives) and transfusions of fresh blood both before and after operation.

Fluid and electrolyte balance must be restored in order to prevent dehydration, restore glycogen to the liver and bring about a favorable exchange between cellular and tissue fluids as well as to promote the dilution and excretion of toxins. A low serum protein particularly affecting the albumin fraction may exist because of a deficiency in hepatic function and inadequacies in diet; transfusions of blood or plasma [16] may restore the protein level.

Poor renal function is equivalent to poor surgical risk.[17] The part played by the kidney in the hepato-

---

From the Department of Surgery, University of California Medical School.

Read before the Section on Surgery, General and Abdominal, at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 5, 1941.

1. Quick, A. J.: Clinical Value of the Test for Hippuric Acid in Cases of Disease of the Liver, Arch. Int. Med. **57:** 544-556 (March) 1936.

2. Kerr, W. J.; Delprat, G. D.; Epstein, N. N., and Dunievitz, Max: The Rose Bengal Test for Liver Function: Studies on the Rate of Elimination from the Circulation in Man, J. A. M. A. **85:** 942-946 (Sept. 26) 1925.

3. Bassett, A. M.; Althausen, T. L., and Coltrin, G.: New Intravenous Galactose Clearance Test for Differentiation of Obstructive from Parenchymatous Jaundice, Proc. Soc. Exper. Biol. & Med. **45:** 405-407 (Oct.) 1940.

4. Ravdin, I. S.: The Protection of the Liver from Injury, Surgery **8:** 204-211 (Aug.) 1940.

5. Althausen, T. L.: Dextrose Therapy in Diseases of the Liver, J. A. M. A. **100:** 1163-1167 (April 15) 1933.

6. Heymann, W.: Importance of the Liver for the Antirachitic Efficacy of Vitamin D, Proc. Soc. Exper. Biol. & Med. **36:** 812-814, 1937.

7. Holman, E. F.: Vitamin and Protein Factors in Preoperative and Postoperative Care of the Surgical Patient, Surg., Gynec. & Obst. **70:** 261-269 (Feb. 15) 1940.

8. Frazier, W. D., and Ravdin, I. S.: The Use of Vitamin B_1 in the Preoperative Preparation of the Hyperthyroid Patient, Surgery **4:** 680-686 (Nov.) 1938.

9. Ivy, A. C., and Berman, A. L.: Rationale of Bile Salt Therapy in Biliary Tract Disease, Minnesota Med. **22:** 815-820 (Dec.) 1939. Berman, A. L.; Snapp, E.; Ivy, A. C.; Atkinson, A. J., and Hough, V. S.: The Effect of Various Bile Acids on the Volume and Certain Constituents of Bile, Am. J. Digest. Dis. **7:** 333-346 (Aug.) 1940.

10. Ravdin, I. S.; Johnston, C. G.; Riegel, Cecilia, and Wright, S. L.: A Study of Human Liver Bile After Release of Common Duct Obstruction, J. Clin. Investigation **12:** 659-672 (July) 1933. Greene, C. H.; Hotz, Richard; Carter, R. F., and Twiss, J. R.: The Postoperative Concentration of Bile Salts in the Human Bile, Am. J. Surg. **49:** 264-280 (Aug.) 1940.

11. Phibbs, B. P.; Wigodsky, H., and Ivy, A. C.: The Effect of Oxidized Bile Salts on Gallbladder Bile, Proc. Soc. Exper. Biol. & Med. **45:** 313-314, 1940. Best, R. R.: Physiological Biliary Flush in the Management of Biliary Tract Disease, Southwest Med. **23:** 396-398 (Dec.) 1939.

12. Horrall, O. H.: Bile: Its Toxicity and Relation to Disease, Chicago, University of Chicago Press, 1938.

13. Quick, A. J.: Prothrombin in Hemophilia and in Obstructive Jaundice, J. Biol. Chem. **109:** lxxiii-lxxiv (May) 1935. Smith, H. P.; Ziffren, S. E.; Owen, C. A., and Hoffman, G. R.: Clinical and Experimental Studies on Vitamin K, J. A. M. A. **113:** 380-383 (July 29) 1939.

14. Almquist, H. J.: Purification of the Antihemorrhagic Vitamin, J. Biol. Chem. **114:** 241-245 (May) 1936.

15. Aggeler, P. M.; Lucia, S. P., and Goldman, Leon: Effect of Synthetic Vitamin K Compounds on Prothrombin Concentration in Man, Proc. Soc. Exper. Biol. & Med. **43:** 689-694 (April) 1940.

16. Ravdin, I. S.; Stengel, Alfred, Jr., and Prushankin, Mitchell: Control of Hypoproteinemia in Surgical Patients, J. A. M. A. **114:** 107-112 (Jan. 13) 1940.

17. Elsom, K. A.: Renal Function in Obstructive Jaundice, Arch. Int. Med. **60:** 1028-1033 (Dec.) 1937.

renal syndrome is important, so that functional tests should be carried out and urinary output watched closely before and especially after operation. Poor renal output is regarded as a serious prognostic sign and may suggest poor hepatic function.

Only under exceptional circumstances are jaundiced patients operated on during elevation or fluctuation of the icteric index; if the jaundice is subsiding, operation should be delayed until the patient becomes free from jaundice, thereby lessening the risk of surgical treatment.

TABLE 1.—*Mortality of Gallbladder Operations at University of California Hospital from 1930 to 1940*

	Number	Deaths	Mortality Rate, Per Cent
Cholecystectomy, chronic disease	290	4	1.4
Cholecystectomy, acute disease	53	2	3.8
Common duct exploration with cholecystectomy or cholecystostomy	86	5	5.8
Cholecystostomy	6	0	0
All cases	435	11	2.5

Many different anesthetic agents have been advocated by various workers. Skilful administration of the agent selected and prevention of anoxia of the liver are important in maintaining adequate function. High concentrations of oxygen should be used, and hypotension and circulatory depression should be avoided.[18] The use of oxygen postoperatively may be advisable.

Sedatives are used only in small doses so as not to depress further the patient with an injured liver. Morphine may cause further depression and provoke anoxia of an already damaged liver.

Postoperative cholangiograms should be made as a routine on all patients whose gallbladder or extrahepatic bile ducts have been drained. The tube in the common duct is not removed until after this procedure has been carried out in the search for an overlooked stone. The work of Best and Hickens,[19] Walters, McGowan, Butsch and Knepper [20] and others has shown that the use of antispasmodic drugs such as amyl nitrite, glyceryl trinitrate and magnesium sulfate, the presence of some fats in the diet and the use of bile salts all have the effect of relaxing the spincter of Oddi, which may control the symptoms of biliary colic after operation or even assist in the passage of an overlooked ductal calculus. Morphine or its derivatives increase the resistance of this mechanism.

TABLE 2.—*Acute Cholecystitis*

	Number	Deaths	Mortality
Cholecystectomy *	53	4	7.5%
Cholecystostomy	6	0	0
Total	59	4	6.8%

* Two deaths of patients with common duct exploration.

18. Ravdin, I. S.; Vars, H. M.; Goldschmidt, Samuel, and Klingensmith, L. E.: Anesthesia and Liver Damage: II. The Effect of Anesthesia on the Blood Sugar, the Liver Glycogen and Liver Fat, J. Pharmacol. & Exper. Therap. **64**: 111-129 (Sept.) 1938.

19. Best, R. R., and Hickens, N. F.: Biliary Dyssynergia: Physiological Obstruction of the Common Bile Duct, Surg. Gynec. & Obst. **61**: 721-734 (Dec.) 1935.

20. Walters, Waltman; McGowan, J. M.; Butsch, W. L., and Knepper, P. A.: The Pathologic Physiology of the Common Bile Duct, J. A. M. A. **109**: 1591-1596 (Nov. 13) 1937.

RESULTS OF SURGICAL PROCEDURES ON THE BILIARY TRACT AT THE UNIVERSITY OF CALIFORNIA HOSPITAL FROM 1930 TO 1940

A study of four hundred and thirty-five primary operations for cholecystic or ductal disease, exclusive of neoplasms and strictures, during the last ten years shows an operative mortality of 2.5 per cent (table 1). The mortality of simple cholecystectomy for acute cholecystitis can be seen to be two and one-half times that for chronic disease. In our hands, exploration of the extrahepatic bile ducts, in addition to surgery of the gallbladder, produced a mortality of 5.8 per cent as compared to 1.7 per cent for simple cholecystectomy for both chronic and acute disease. This seems plausible because those patients whose common ducts were explored had more extensive disease, were often jaundiced and had impaired hepatic function; in addition, it is logical to anticipate a higher mortality if the operation is more extensive.

The operative mortality of cholecystectomy for acute cholecystitis was 3.8 per cent, but the inclusion of two deaths of patients who, in addition, had exploration of the common duct brought the mortality up to 6.8 per cent (table 2). Throughout this period of ten years, delayed or late operation was the preferred method of treatment for acute cholecystitis. If, while under observation, the inflammation of the gallbladder appeared to subside, it was permitted to resolve completely and, after a period of from three to five weeks, operation was performed. If, after a reasonable period of observation, the infection appeared to be stationary or progressing, immediate intervention was carried out to avert the danger of perforation. In the aged patient, the signs may be minimal and the disease advanced. In elderly patients, who so frequently are poor risks, or those who have associated acute pancreatitis or pancreatic edema, cholecystostomy is preferred. This procedure was carried out in 6 such cases without a death. An attempt is always made to judge the basis of treatment for each patient by the merits of his particular case.

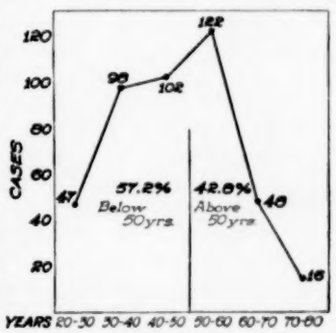


Chart 1.—Operations by age groups in all cases of gallbladder disease.

The causes of death of patients who had simple cholecystectomy differed from the causes found in those whose common bile ducts were explored. The patients who had no investigation of the ducts died of sepsis, bile peritonitis and cardiac or respiratory complications. In those who had ductal exploration, two deaths were caused by acute necrosis of the liver, hemorrhage and hepatorenal insufficiency; in two others intrahepatic jaundice was erroneously diagnosed before operation as being extrahepatic in origin. Consideration of these deaths makes evident the importance of proper evaluation of the functional state of the liver and proper diagnosis in patients with suspected disease of the bile ducts.

A study of patients by age groups (chart 1) shows that the greatest number underwent surgery during the sixth decade. Two hundred and forty-nine, or 57.2 per cent, were below the age of 50 years, while 186, or 42.8 per cent, were above that age, an important factor when considered in relation to the incidence of exploration of the common duct and mortality.

EXPLORATION OF THE COMMON DUCT

During the ten years, 19.8 per cent of all patients had their extrahepatic ducts explored, and formed stones were removed in 10.9 per cent of these (chart 2). The incidence of ductal exploration, by decades, varied from 10.6 to 14.3 per cent in patients under 50 years of age to as high as 43.7 per cent in those over 50 years of age

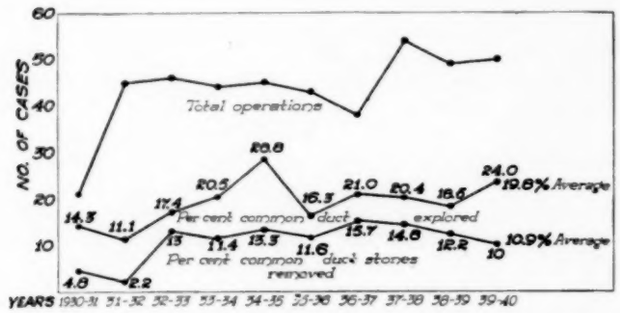

NO. OF CASES
Total operations
Per cent common duct explored
Per cent common duct stones removed
19.8% Average
10.9% Average
YEARS 1930-31 31-32 32-33 33-34 34-35 35-36 36-37 37-38 38-39 39-40

Chart 2.—Percentage of common duct exploration from 1930 to 1940 by years.

(chart 3). This suggests that surgical treatment in patients under 50 years of age will prevent ductal complications and also avoid the higher mortality resulting from such complications. It also implies that when the majority of patients treated are under 50 years of age the incidence of exploration of the common duct will be lower than when the ages are higher. At this hospital the incidence of exploration of the common duct is lower than that reported by many authors,[21] some of whom report exploration in from 35 to 50 per cent of patients with cholelithiasis but the removal of stones in only about 50 per cent of the ducts explored. In most of our cases of disease of the gallbladder the common bile duct, which is always exposed, was found to be normal in size and, unless such a patient had recently experienced colic, was jaundiced at the time of operation or had palpable stones in the common duct, exploration was not done. Since the enthusiasm for exploration of these ducts during the past five years, we have encountered many patients with stricture or biliary fistula who, at the original operation, had exploration of ducts normal in size. Technical difficulties and the dangers of resultant stricture from exploring a duct of normal size are much greater than those encountered in opening a dilated common bile duct.

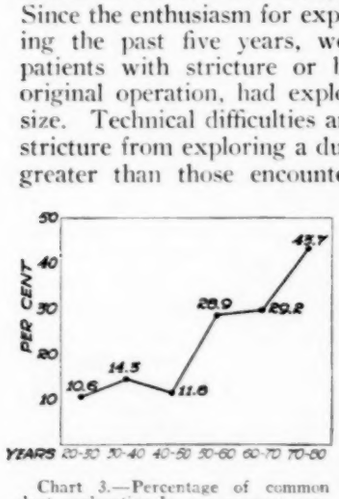


Chart 3.—Percentage of common duct exploration by age groups; common duct explored in 19.8 per cent.

In our group of eighty-six primary explorations of the common duct, reoperation has been necessary for 5 patients. In 4 of these no stones were found, though stones had been removed originally from the common duct; a stone was removed from 1 patient in whom no stone was found at the original exploration of the common duct (this was before postoperative cholangiography was used routinely). Except for patients who had cholecystostomy for acute cholecystitis, only 1 patient whose common duct was not explored at the first operation was operated on a second time; a large amount of "liver sand" was removed. This patient originally had a cholecystoduodenal fistula which was closed at the primary operation when the gallbladder was removed. This suggests that symptoms after cholecystectomy are more likely to develop in patients who have had ductal exploration than in those who have not. Of patients whose common bile ducts were explored, follow-up showed between 74 and 82 per cent to be cured or improved. These patients with secondary negative ductal exploration for postoperative colic may have had chronic or acute pancreatitis, spasm of the sphincter of Oddi or duodenitis.

FOLLOW-UP

Of patients who had cholecystectomy for chronic cholecystitis with cholelithiasis, 93.3 per cent were reported to be improved or cured, while only 61.1 per cent of those with chronic noncalculous cholecystitis [22] could be placed in this category. The residual complaints of pain, gas and indigestion were more frequent in the patients who had no stones than in those with cholelithiasis (table 3).

The causes of poor end results in our cases were error in diagnosis, chronic cholecystitis without stones, a grossly normal gallbladder, biliary dyskinesia, associated long-standing hepatic or pancreatic disease, or the removal of a functionless painless gallbladder even though it contained calculi.

Some of our patients in whom a grossly normal stoneless gallbladder was found at operation or who probably had dyskinesia and still had symptoms after operation noted that these symptoms were relieved temporarily, only to recur a few weeks or months after operation.[2] Such pains have been attributed to various causes. The sphincter of Oddi may lose its tone postoperatively and regain it after a few weeks or months at about the time that dilatation of the ducts takes place.[23] Transient increased resistance of the choledochoduodenal mechanism in the absence of the pressure regulating function of the gallbladder may cause pain by distention of the ducts.[24] This is exemplified by the earlier onset of jaundice in animals that had their common ducts ligated with excision of the gallbladder than in those in which the organ was left in place.[24] Intermittent obstruction of the common duct by a spastic sphincter without the cushioning effect of the gallbladder may cause distention of the bile ducts, icterus and dull pain or biliary colic. The dilatation

TABLE 3.—*Follow-up Results of Cholecystectomy*

	Residual Complaints		
	Pain	Gas	Indigestion
Chronic cholecystitis with stones	5.6	28.2	16.3
Stoneless gallbladder	11.1	33.3	27.7

21. Lahey, Frank H.: The Technic of Cholecystectomy and Choledochostomy, S. Clin. North America **19:** 597-605 (June) 1939. Allen, A. W.: The Surgical Management of the Usual Extrahepatic Biliary Lesions, Surgery **8:** 188-203 (Aug.) 1938. Zollinger, Robert: Surgical Treatment of Gallbladder Disease, Rev. gastroenterol. **7:** 420-429 (Oct.) 1940. Cole, Warren H.: Present Day Concepts in Handling Gallbladder Disease, Nebraska M. J. **25:** 429-434 (Dec.) 1940.

22. Doehring, Paul C.: Macroscopically Nonpathologic Gallbladder: A Clinicopathologic Study, Arch. Surg. **42:** 665-680 (April) 1941. Cole, Warren H.: Noncalculous Cholecystitis, Surgery **3:** 824-839 (June) 1938. Bergh, G. S.; Sandblom, Philip, and Ivy, A. C.: The Effects of Removal of the Functioning Gallbladder, Surg., Gynec. & Obst. **62:** 811-814 (May) 1936. Doubilet, Henry, and Colp, Ralph: The Resistance of the Sphincter of Oddi in the Human, ibid. **64:** 622-633 (March) 1937. Puestow, C. B.: Changes in Intracholedochal Pressure Following Cholecystectomy, ibid. **67:** 82-86 (July) 1938.

23. Graham, E. A., and Mackey, W. A.: A Consideration of the Stoneless Gallbladder, J. A. M. A. **103:** 1497-1499 (Nov. 17) 1934. Layne, J. A., and Bergh, George S.: An Experimental Study of Pain in the Human Biliary Tract Induced by Spasm of the Sphincter of Oddi, Surg., Gynec. & Obst. **70:** 18-24 (Jan.) 1940.

24. Ivy, A. C., and Goldman, Leon: Physiology of the Biliary Tract, J. A. M. A. **113:** 2413-2417 (Dec. 30) 1939. Mann, F. C., and Bollman, J. L.: The Relation of the Gallbladder to the Development of Jaundice Following Obstruction of the Common Bile Duct, J. Lab. & Clin. Med. **10:** 540-543 (April) 1925.

of the extrahepatic ducts does not entirely compensate for the loss of storage, concentrating and contracting functions of the gallbladder. The removal of the stoneless gallbladder therefore may not only be without benefit but may be harmful.

SUMMARY

1. Newer physiologic concepts have permitted a lower mortality in surgery of the biliary tract by providing more rational care both before and after operation.

2. In our cases during the last ten years the mortality of exploration of the common duct, in addition to operation on the gallbladder, is over three times that of cholecystectomy alone.

3. Exploration of the common bile duct was performed in 20 per cent of all our operations, but stones were removed in only 11 per cent. The incidence of the indications for exploration of the common bile duct will partially depend on age groups. Stricture or fistula of the common bile duct has become more common during the past five years.

4. Symptoms after cholecystectomy, requiring secondary operation, were more frequent in those who had ductal exploration than in those who did not.

5. The morbidity and mortality of ductal disease are minimal before the sixth decade, offering evidence of the wisdom of earlier operation.

6. Follow-up of our patients operated on over a period of ten years showed 93 per cent cured or improved among those who had chronic cholecystitis with stones, while in those without stones only 60 per cent reported cure or improvement.

ABSTRACT OF DISCUSSION

DR. WARREN H. COLE, Chicago: The authors reported a higher incidence of cure in patients on whom they had done cholecystectomy when stones were present than when stones were not present. The figure is about 93 versus 60 per cent. The inferior results in the patients without stones is explained largely on the basis of a large amount of error in diagnosis. When stones are present there is an obvious and mechanical explanation for symptoms. It is beginning to be realized that many of these gallbladders in which the condition is classified as chronic cholecystitis have inflammation which perhaps is primarily chemical. Later on this chronic fibrotic wall may become infected. There is not total agreement on this point, but I myself am convinced that the chemical inflammation exerts a very important role in the lesion, not only in many acute cases, but in many chronic cases as well. The authors touched on the question of the difference in mortality rate in cholecystectomy for acute cholecystitis versus cholecystectomy for chronic cholecystitis. In their series the mortality rate was much higher in the acute cases. Many surgeons report mortality figures for acute disease that are only slightly higher than in their chronic cases. The explanation of the comparatively low figures for acute cholecystectomy probably lies in the fact that the disease is caused by chemical inflammation and not bacterial. I take the same attitude as the authors in the question of cholecystectomy for acute cholecystitis, namely that they do not operate in all cases of acute cholecystitis. I usually do not but in general adopt an attitude somewhat as follows: If the temperature fails to show a distinct downward trend in thirty-six hours, or if the pain tends to increase and the muscle spasm increases with a rising leukocytosis, an emergency operation should be done. If one utilizes a rule such as that, one will not have many perforated and gangrenous gallbladders; at any rate, I have not seen one in ten years. Relative to Dr. Goldman's remark that better results are obtained in common duct obstruction if operation is performed several days after the onset of jaundice, that is, when it is decreasing or at least not increasing, this is difficult to explain, although it is the experience all of us have. A possible explanation is that after obstruction exists for several days the common duct dilates sufficiently for bile to pass around the stone and again enter the intestine.

FRACTURES OF THE SPINE

A STUDY OF TWO HUNDRED CASES

S. BERNARD WORTIS, M.D.
AND
LEWIS I. SHARP, M.D.
NEW YORK

There is considerable difference of opinion regarding the treatment of fractures of the spine—especially cases showing complicating neurologic signs. In view of this we undertook the present analysis of 200 consecutive cases of fracture of the spine admitted to Bellevue Hospital during the years 1930-1934. This material is presented in order to help formulate a rational routine treatment of fractures of the spine. Among many contributions we refer especially to the work of Frazier,[1] Jefferson,[2] Grant,[3] Head, Riddoch,[4] Walsh, Taylor,[5] Elsberg,[6] Stookey,[7] Naffziger,[8] Coleman,[9] Pollock,[10] Scarff,[11] Crutchfield[12] and others who have often stressed the wisdom of conservatism in the management of injuries to the spine.

All our patients had definite evidence of a fracture of the spine as established by positive roentgen evidence, postmortem evidence or gross and severe deformity of the spine with associated neurologic signs.

The following observations are of interest:

1. Of our 200 unselected consecutive patients with fracture, 169 were men and 31 were women (table 1).

2. An analysis of the nature of the trauma showed that 117 fell from a height, 69 had a direct trauma (of which 31 were by automobiles), 2 were thrown and in 12 instances the cause was not determined (table 1).

3. There were 35 deaths, the commonest causes being shock, respiratory failure in cases of injury to the cervical spine, complicating bronchopneumonia or complicating head injury (table 2).

4. The distribution of cases as regards sites of fracture is of interest. There were 52 in the cervical region, 40 in the thoracic region, 104 in the lumbar region and only 4 in the sacrococcygeal spine. As

From the Neurological Department (Cornell), Bellevue Hospital.
Read before the Section on Nervous and Mental Diseases at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 4, 1941.
The director of the Neurological Division, the director of the Pathologic Department and the directors of the four surgical divisions of Bellevue Hospital gave their permission to study this material, and Miss Sarah P. Shiras helped with the early collection of some of the material.

1. Frazier, C. H., and Allen, A. R.: Surgery of the Spine and Spinal Cord, New York, D. Appleton & Company, 1918, pp. 325-456.
2. Jefferson, Geoffrey, and others, in Discussion on Spinal Injuries, Proc. Roy. Soc. Med. (Sect. Orthop.) **21:** 21-44 (Feb.) 1928.
3. Grant, F. C.: Injuries of the Spinal Cord, in Christopher, F.: Textbook of Surgery, ed. 2, Philadelphia, W. B. Saunders Company, 1939, pp. 320-327.
4. Riddoch, G.: The Reflex Functions of the Completely Divided Spinal Cord in Man, Compared with Those Associated with Less Severe Lesions, Brain **40:** 264 (Nov.) 1917.
5. Taylor, A. S.: Is Early Operation Indicated in Fractures of the Spine with Cord Symptoms? New York M. J. **107:** 583-585 (March 30) 1918.
6. Elsberg, C. A.: Injuries of the Spinal Cord and Nerve Roots, in Brock, S.: Injuries of Skull, Brain and Spinal Cord, Baltimore, Williams & Wilkins Company, 1940, chap. 19, p. 495.
7. Stookey, B.: The Management of Fracture Dislocations of the Vertebrae Associated with Spinal Cord Injuries, Surg., Gynec. & Obst. **64:** 407-419 (Feb., no. 2 A) 1937.
8. Naffziger, H. C.: Neurologic Aspects of Spine Injuries, J. Bone & Joint Surg. **20:** 444-448 (April) 1938.
9. Coleman, C. C.: Treatment of Fracture Dislocations of the Spine Associated with Cord Injury, J. A. M. A. **111:** 2168-2172 (Dec. 10) 1938.
10. Pollock, L. J.: Trauma and Disease of the Nervous System, in Brahdy, L., and Kahn, S.: Trauma and Disease, Philadelphia, Lea & Febiger, 1937, chap. 10.
11. Scarff, John E.: Pathology and Treatment of Spinal Injuries, New York State J. Med. **37:** 461-477 (March 1) 1937.
12. Crutchfield, W. G.: Fracture-Dislocations of Cervical Spine, Am. J. Surg. **38:** 592-598 (Dec.) 1937; Treatment of Injuries of the Cervical Spine, J. Bone & Joint Surg. **20:** 696-704 (July) 1938.

would be expected, the higher the site of fracture, the higher the mortality and morbidity rate. Twenty-one fractures in the cervical, 13 in the thoracic, 1 in the lumbar and none in the sacrococcygeal region were fatal (table 3). Only 86 of the 200 cases presented neurologic signs.

TABLE 1.—*Age and Sex Distribution of Patients with Fractures of the Spine: Nature of Trauma*

Age Distribution of Patients Age by Decades	Number of Patients
10-19	12
20-29	36
30-39	53
40-49	47
50-59	26
60-69	12
70-79	3
80-89	1
Unknown	10
Total	200
Males	169
Females	31
Nature of Trauma	
Fall from a height	117
Direct trauma	
Struck (31 by automobiles)	69
Thrown	2
Cause not determined	12

5. A curve of incidence of specific areas of injury to the spine is of interest because it shows clearly that the commonest sites are at the levels of the second cervical, the sixth cervical and the twelfth thoracic or first lumbar vertebra. The accompanying chart confirms a similar observation by Jefferson, who studied statistically 2,006 cases of fractures of the spine.

6. (*a*) Careful analysis of the 52 patients with fracture of the cervical spine showed that 73 per cent had evidence of injury to the spinal cord or root. Moreover, 75 per cent of the patients who had neurologic signs died. Five of these latter patients had priapism and all died. Priapism was found present only in patients with injury to the cervical cord, and evidently it was an ominous sign. Another interesting feature of the cases in this group was that 3 pathologic fractures occurred in the cervical region (table 4).

(*b*) Analysis of the 40 cases in which there was a fracture of the thoracic spine showed that in 58 per cent

TABLE 2.—*Causes of Death*

Cause of Death	No. of Cases
Shock	10
Respiratory failure	7
Bronchopneumonia	7
Alcoholism and bronchopneumonia	4
Head injury, alcoholism and bronchopneumonia	2
Lobar pneumonia	1
Peritonitis (fracture of pelvis)	1
Postlaminectomy meningitis	1
Pyelitis	1
Decubitus and pyelitis	1
Total	35

there was evidence of injury to the spinal cord or root. In this group 52 per cent of the patients with neurologic signs died (table 5).

(*c*) Of the 104 persons with fractures of the lumbar spine only 24 per cent showed evidence of injury to the spinal cord or root. Of these, only 4 per cent (i. e. 1 patient) with positive neurologic signs died; in addition this patient was addicted to alcohol and sustained an injury to the head (table 6).

(*d*) The 4 patients with a fracture of the sacral spine all recovered; none presented neurologic signs (table 6).

7. The different types of injury to the spine occurring at the various spinal levels is of interest. In the cervical region, fracture dislocation was by far the commonest injury. In the thoracic region fracture dislocation and compression fractures are common, whereas the compression fracture is by far the commonest injury of the lumbar spine. Fractures of the transverse processes are commonest in the lumbar region (table 7).

8. The results of laminectomy are recorded in table 8 and show that of 15 patients operated on 8 died, 5 showed no improvement and only 2 showed improvement. These, of course, represent results of severe injury. Lumbar spinal fusion operations for chronic cases with root pain were performed on 3 subjects, and this procedure was beneficial.

9. Twelve patients came to autopsy. Of these 6 had pulpification of the spinal cord, 3 had severe hematomyelia mostly involving the gray matter of the cord. For the remaining 3, the pathologic report of the spinal cord is not available, but 2 died of shock and 1 died of bronchopneumonia (tables 11 and 12).

10. Sixty-one subjects had disturbances of control of the sphincter of the bladder and of the rectum. Of these 23 died, 14 of whom had injuries of the cervical

TABLE 3.—*Composite Statistics*

	Total Cases	Fatal	Improved or Recovered	Unimproved
Cervical *	52	21	29	2
Thoracic	40	13	20	7
Lumbar	104	1	96	7
Sacrococcygeal	4	0	4	0
Totals	200	35	149	16

48 patients had cerebral concussion 24 cervical cases
22 patients were under influence of alcohol
86 patients had positive neurologic signs

* Eight of 12 at sixth cervical were fatal; 6 in which laminectomy was done were fatal.

cord, and only 9 had injuries of the thoracic cord. Only 12 patients had infections of the bladder and only 25 had trophic ulcers.

11. An important neurophysiologic and clinical observation relates to the significance of spastic or flaccid paraplegia. Twenty-five subjects had spastic paraplegia. Of these, 19 improved or recovered and 3 died, whereas 40 had flaccid paraplegia of whom only 3 improved or recovered, 12 were unimproved and 25 died. These data clearly emphasized the ominous significance of flaccid paraplegia complicating fracture of the spine (table 10).

12. Lumbar puncture manometric tests were performed in only 25 cases (table 13). We want to emphasize that 11 patients with severe damage to the cord had no evidence of manometric block. Another 8 patients with no evidence of damage to the cord had no block. The remaining 6 patients had complete manometric block. Of these, 3 were unimproved and 3 improved.

PATHOLOGIC AND PHYSIOLOGIC CONSIDERATIONS

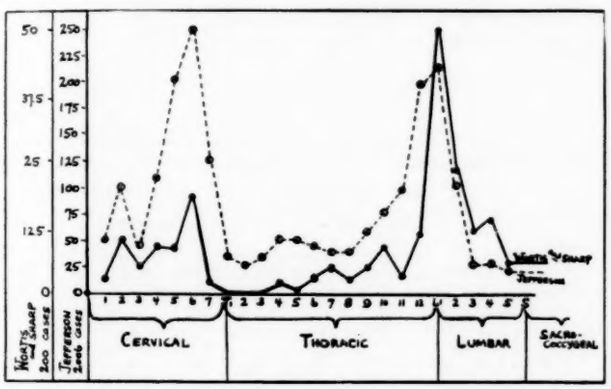
Many investigators have emphasized the variety of pathologic changes in the spinal cord following injury to the spine. We agree with Charles Davison, who lists possible acute traumatic changes of the spinal cord as concussion, with or without small hemorrhages,

hematorachis (extradural, subdural and subarachnoid), hematomyelia (large or small) which may go on to softening and gliosis, herniation of the intervertebral disk, pulpification or/and injury to the nerve roots. In the subacute or chronic stage, one finds subarachnoid adhesions, herniation of the intervertebral disk, hypertrophy of the ligamentum flavum, gliosis or cavitation of the cord and bony changes hypertrophic, or atrophic (resulting in Kümmell's disease).

One important fact which requires repeated emphasis is that the hemorrhages in the spinal cord are most apt to occur into the soft gray matter of the cord.

Careful survey of our case records and careful review of the clinical course of these patients substantiate the excellent observations of Riddoch.[4] He described three clinical stages in the course of acute complete transverse spinal cord lesions.

The first stage of spinal shock or flaccidity immediately follows acute transection of the spinal cord. The subject "feels as though he were suddenly broken in half," and spinal shock follows. Muscles innervated by segments of the spinal cord below the level of the lesion are flaccid and completely paralyzed. The deep and superficial reflexes are abolished and muscle tonus is lost. All sensation is lost below the level of the



Curve of incidence of site of fractures of spine.

lesion. The skin is dry, the bladder and rectum are paralyzed and the penis is flaccid. The blood pressure drops temporarily owing to the impairment of tonic vasomotor reflexes which normally receive medullary innervation to sympathetic lumbar cord cells by way of the roots from the first thoracic to the second lumbar segment of the spinal cord. Transections of the cord below the level of the second lumbar segment produce little fall in blood pressure. Transverse lesions of the cervical spine often produce priapism; the exact pathophysiology of this response is not known. The paralyzed extremities are cyanotic and cold and tend to pressure ulceration, and there is an absence of secretion of sweat. This stage lasts three or four weeks.

In the second stage, reflex activity begins to reappear in the isolated segment of the cord. Functional activity first returns to smooth muscle. The sphincter of the bladder begins to recover before the detrusor muscle of the bladder. Retention of urine must be dealt with by catheterization, or better still by Munroe's tidal drainage. Next, tone returns to the paralyzed blood vessels. Proprioceptive reflexes concerned with postural tone reappear early, and there is paraplegia in flexion due to increase in the tonus of the flexor muscles. Phasic reflexes appear in the nature of flexor reflexes and the Babinski sign. In this stage one may see the mass reflex action consisting of flexion of the lower extremities, contraction of the muscles of the abdomen, evacuation of the bladder and profuse sweating of the skin situated below the level of the lesion. This is evidence of the reflex action of the isolated segment of the spinal cord. One occasionally finds a coitus reflex

TABLE 4.—*Fractures of Cervical Spine (Fifty-Two Patients)*

	Patients	
Had evidence of spinal cord or root injury, 73 per cent		
Had no neurologic signs and recovered		15
Died in shock soon after admission		3
Had radicular signs		8
Improved or recovered	6	
Did not improve	1	
Died of complications (postoperative meningitis following laminectomy)	1	
Had evidence of spinal cord injury		26
Had spastic paraplegia	11	
(Of whom 3 died, 1 was unimproved when he left the hospital at own request and 7 were improved or recovered)		
Had flaccid paraplegia	15	
(Of whom 14 died and 1 improved)		
* 75 per cent with fracture of cervical spine and neurologic signs died		21 of 26
Total with cervical spine fractures		52
Died	21	
Improved or recovered	29	
Unimproved	2	
* Had pathologic fractures		3
Pott's disease at the third cervical	1	
Cystic degeneration of body of second cervical with fracture dislocation	1	
Metastatic cancer at third cervical	1	
* Had priapism and all died		5
(Lesions at levels of third cervical, fourth and fifth cervicals, sixth cervical, seventh cervical)		
Had multiple fractures		12

consisting of priapism and seminal emission elicited on the slightest stimulation of the glans penis. Other evidences of return of reflex activity are the reappearance of knee and ankle jerks, sweating of the skin, improvement in cutaneous circulation and the tendency of decubitus sores to heal.

In the third stage there is neurophysiologic evidence of gradual failure of reflex function of the isolated segment of the spinal cord. The reflexes diminish and then disappear, the reflexogenic cutaneous zone becomes smaller, the affected muscles atrophy, bed sores enlarge and bladder function is progressively impaired.

Clinically complete transverse lesions of the spinal cord are characterized by the following: The paralysis

TABLE 5.—*Fractures of Thoracic Spine (Forty Patients)*

	Patients	
Had evidence of spinal cord or root injury, 58 per cent		
Had no neurologic signs and all recovered		15
Died in shock of cerebral complicating injury soon after admission		2
Had radicular signs and recovered		1
Had evidence of spinal cord injury		22
Had spastic paraplegia and all improved or recovered	4	
Had flaccid paraplegia	18	
Died	11	
Unimproved	7	
* 52 per cent with fractures of the thoracic spine and neurologic signs died		13 of 25
Total with thoracic spine fractures		40
Died	13	
Improved or recovered	20	
Unimproved	7	
Had multiple fractures of dorsal or dorsolumbar spines		7
No recorded priapism in this group		
No pathologic fractures in this group		

is complete and symmetrical, voluntary movement does not return; the vasomotor and sphincter disturbances are significant, the deep reflexes are absent in the lower limbs, the sensory loss is total, spinal reflex such as the uniphasic flexion response is present and the Babinski toe sign, though absent early, appears in about three weeks. There are no associated irritative phenomena such as pains or hyperesthesias. In our experi-

ence, the very slow flexion of the toes on plantar stimulation (Gordon Holmes [13] reflex) is an early and ominous sign of severe cord damage or transection.

In incomplete transection of the spinal cord, higher levels of the brain stem influence the motor picture by

TABLE 6.—*Fractures of Lumbar Spine (One Hundred and Four Patients): Fracture of Sacral Spine (Four Patients)*

	Patients
Fractures of lumbar spine	
Evidence of spinal cord or root injury, 24 per cent	
Had no neurologic signs and recovered	79
Died in shock soon after admission	1
Had radicular signs (all improved or recovered)	7
Had evidence of spinal cord injury	17
Had spastic paraplegia	10
Improved or recovered	8
Remained unimproved	2
Had flaccid paraplegia	7
Improved or recovered	2
Remained unimproved	5
* 4 per cent with fractures of the lumbar spine and neurologic signs (shock case) died; patient was alcoholic and had cerebral concussion	1 of 25
Total with lumbar spine fractures	104
Died	1
Improved or recovered	96
Unimproved	7
33 had multiple fractures	
No pathologic fractures in this group	
Fracture of sacral spine	
None had neurologic signs and all recovered	4

way of vestibulospinal pathways to produce a picture of paraplegia in extension. This produces biphasic reflex movements (flexion and extension) and an extensor thrust. Occasionally one sees "steppage" movements in the nature of flexion of one limb and extension of the opposite limb. In summarizing the clinical picture of an incomplete transverse lesion of the spinal cord, we may say that it is characterized by the following: The paralysis is incomplete and asymmetrical; voluntary movement returns; vasomotor and sphincter disturbances are mild; deep reflexes in the lower limbs are present; sensory defects are only partial;

TABLE 7.—*Types of Fracture*

	Dislocation	Simple	Compression	Fracture Dislocation	Lamina	Transverse Process	Spine	Total
Cervical	1	6	6	33	2	0	4	52
Thoracic	1	3	15	19	1	0	1	40
Lumbar	0	4	54	15	1	30	Involved	104
Sacrococcygeal	1 sacral	0	2	1 coccygeal	0	0	0	4
Totals	3	13	77	68	4	30	5	200

TABLE 8.—*Laminectomy Results*

	Number	Improved	Unimproved	Died
Cervical	6	..	..	6
Thoracic	4	1	1	2
Lumbar	5	1	4	..
Total	15	2	5	8

spinal automatisms show biphasic flexion and extension, an extensor Babinski toe sign and a predominance of extensor reflexes. Irritative phenomena in the nature of hyperesthesias and pains are present.

The evaluation of these clinical-neurophysiologic descriptions of complete and incomplete lesions of the spinal cord are most helpful to the physician or surgeon who deals with injuries to the spine.

13. Holmes, Gordon: Spinal Injuries of Warfare, Brit. M. J. **2**: 769, 1915.

TREATMENT RECOMMENDED

In view of the data presented, we would like to emphasize the wisdom of conservatism in dealing with fractures of the spine complicated by injury to the cord. A person who has flaccid paraplegia should never be operated on.

All persons with head injuries should have roentgenograms made of the spine. Fifty per cent of our patients with fracture of the cervical spine had associated cerebral concussion.

We believe that the following procedures are most effective:

1. There should be immediate first aid. People with an injury to the spine are best left alone until they can come under skilled management. The public, especially policemen, interns, hospital attendants and other persons who are apt to render first aid, must be taught that this group of injured patients are best moved on a flat board, preferably in positions of mild extension

TABLE 9.—*Bladder and Rectal Sphincter Disturbance*

	Number of Cases	Number of Deaths
Cervical	20	14
Thoracic	21	9
Lumbar	20	0
Sacrococcygeal	0	0
Bladder infections	12	
Trophic ulcers	25	

TABLE 10.—*Spastic and Flaccid Paraplegias*

	Spastic Paraplegia				Flaccid Paraplegia			
		Improved or Recovered	Unimproved	Died		Improved or Recovered	Unimproved	Died
	Total				Total			
Cervical	11	7	1	3	15	1	..	14
Thoracic	4	4	..	..	18	..	7	11
Lumbar	10	8	2	..	7	2	5	..
Totals	25	19	3	3	40	3	12	25
	*	12% died			*	63% died		

with minimum manipulation. For injuries to the cervical spine it is imperative that the neck be immobilized in extension.

2. Shock should be treated immediately, while the subject is on the stretcher, by appropriate methods. Morphine should not be given.

3. As soon as the period of systemic shock has passed, a roentgenogram should be taken of the spine while the patient is still on the stretcher. This avoids unnecessary manipulation with the related possibility of increasing damage to the spinal cord.

4. The patient should then be put to bed with the appropriate correction of the spinal deformity and a careful general and neurologic examination made and recorded in detail. These data, together with the history, will give the physician an accurate appraisal of the patient's status and will serve as a point of reference in watching the progress of the injury to the cord and thereby help to modify the treatment. The spinal deformity should be corrected and the spine then immobilized by an appropriate method.

5. The following are indications for operative surgical intervention, which should always be done extradurally:

(*a*) When a lamina of the spinal cord is fractured, causing cord compression, hyperextension with pressure

directed at the point of deformity is contraindicated. In these cases operative removal of the offending fractured lamina should be done, and it is important that the surgeon do his work extradurally.

clinical signs increase, decompressive laminectomy is indicated. This group is the only one in which spinal fluid manometric studies are of value. We do not believe that routine spinal taps in all cases of acute

TABLE 11.—*Autopsy Findings*

Location	Injury to Bone	Cord Injury	Other Findings	Cause and Time of Death
Third cervical	Fracture dislocation	Pulpification	Ruptured spleen; fracture of 6th and 7th ribs	Respiratory failure
Fourth cervical	Fracture dislocation	Pulpification	0	Respiratory failure
Seventh cervical	Spines	0	Fracture of ribs, sternum, clavicle, pelvis, mediastinal hemorrhage	Shock
Sixth cervical	Fracture dislocation	Hematomyelia	0	Died 7th day
Sixth cervical	Fracture dislocation	Hematomyelia	0	Died in 18 hours
Sixth cervical and seventh thoracic	Fracture dislocation with free mobility	Pulpification	Fracture of ribs	Shock few hours
Tenth thoracic	Compression fracture	Pulpification	Thrombosis of right middle cerebral artery, anemic infarction of right basal ganglions, punctate hemorrhage of right cerebrum	?
Ninth and tenth thoracic	Separation	0	Fracture of 4th to 10th ribs; bronchopneumonia; cerebral arteriosclerosis	Bronchopneumonia
Twelfth thoracic	Fracture dislocation	Pulpification	0	Died 14th day
Twelfth thoracic	Fracture dislocation	Swelling, softening, hemorrhage	0	12 hours
Twelfth thoracic and first and second lumbar	Compression fracture	?	0	Shock
First lumbar and sixth and seventh thoracic	Compression fracture; separation of sixth and seventh thoracic	Pulpification	0	Third day

TABLE 12.—*Operative Findings*

Type of Operation	Location	Findings	Results
1. Laminectomy	Second cervical	Fracture dislocation of second cervical; compression distortion of cord	Died 2d postoperative day
2. Laminectomy	Fourth and fifth cervical	Fracture dislocation of fourth cervical with crushing of cord	Died 24 hours after operation
3. Laminectomy	Sixth cervical	Fracture dislocation of sixth cervical; hematomyelia; postoperative meningitis	Died
4. Laminectomy	Third to sixth cervical	Fracture dislocation of fifth cervical; dura intact, no hemorrhage seen; compression of cord	Died 1st postoperative day
5. Laminectomy	Fifth to seventh cervical	Fracture dislocation of sixth cervical; no gross pathology seen	Died 3d postoperative day
6. Laminectomy	Fifth to seventh cervical	Fracture dislocation of sixth cervical; compression of cord	Died 12 hours after operation
7. Laminectomy	Ninth to eleventh thoracic	Dura not opened; no gross pathology	Unimproved
8. Laminectomy	Eighth to twelfth thoracic	Fracture eleventh thoracic; subdural hematoma; cord not compressed	Much improved; sensation and motor power returned
9. Laminectomy	Twelfth thoracic	Fracture dislocation of twelfth thoracic; compressed cord	Died 133d postoperative day; infected red sores and pyelitis
10. Laminectomy	Twelfth thoracic	Fracture dislocation of twelfth thoracic; cord swollen and compressed	Died in 12 hours
11. Laminectomy	Twelfth thoracic to second lumbar	Fracture dislocation with thinning of cord	Unimproved
12. Laminectomy	Twelfth thoracic to second lumbar	Fracture dislocation of first lumbar; compression of cord with subdural hematoma	Unimproved
13. Laminectomy	First lumbar	Compression fracture of first lumbar; no pathology seen	Improved
14. Laminectomy	First lumbar	Not described	Partial return of sensation and bladder function 2 years later
15. Laminectomy	First to third lumbar	Compression of cord; extradural hemorrhage; dura not opened	Unimproved
16. Spinal fusion	First lumbar	Compression fracture of first lumbar	Improved
17. Spinal fusion	Third lumbar to sacral	Old fracture of fourth lumbar	Improved
18. Spinal fusion	Third lumbar to sacral	Fracture of fifth lumbar	Much improved
19. Removal of coccyx	Coccyx	Removal of displaced and fractured coccyx	Recovered

(*b*) Patients showing after spine injury, incomplete cord lesion and definite evidence of bone fragments in the canal.

(*c*) Some cases with signs of incomplete cord lesion show evidence of progressive cord dysfunction despite reduction and immobilization. Spinal tap should be performed and if manometric block is present and the fracture of the spine are necessary. Only those patients should have lumbar puncture manometric tests who, it is believed, can be helped by operation. If there is no bone in the canal and the system is open, there is obviously no need to operate. We do not agree that in every case a spinal fracture requires a lumbar puncture manometric test; the procedure has definite risk associ-

ated in the act of moving the patient. Careful roentgen studies are of much greater value.

(*d*) Lesions of the cauda equina should be treated like peripheral nerve lesions. Laminectomy is indicated when bony compression injures the nerve elements of the cauda.

(*e*) Cases of intractable root pain secondary to fracture of the spine or of a lamina will occasionally require the attention of the surgeon.

6. Other aids used in caring for these patients are:

(*a*) Air mattress and care of the skin to prevent bed sores.

(*b*) Care of the bladder. Early in flaccid states of spinal shock the bladder should be treated according to the method of Credé. Later in flaccid or spastic cases with troublesome urinary retention, tidal drainage is most effective.

(*c*) Care of the bowels: The patient should not be disturbed for the first forty-eight to seventy-two hours after injury. Subsequently, colonic irrigations should be used every second or third day.

TABLE 13.—*Spinal Manometric Tests*

25 tests were done on the 200 cases.

		Patients
Severe cord damage and no manometric block		11
Taps were bloody	6	
with flaccid paraplegia	4	
with spastic paraplegia	2	
Clinical evidence of severe cord dysfunction, negative spinal manometric tests and cerebrospinal fluid clear	5	
No evidence of cord damage; had no block		8
Complete manometric block		6
Flaccid paraplegia	3	
Spastic paraplegia	2	
Only root signs	1	
Died	1	
Unimproved	2	
Improved	3	
No evidence of manometric block		19
Nevertheless, severe damage of the spinal cord	11	

(*d*) Care of the limbs: Place a cradle over the foot of the bed to relieve the feet of pressure of the blankets. Use foot rolls to bolster and dorsiflex the feet to avoid shortening of the tendon with resultant deformity. Later, posterior molded splints can prevent foot drop.

(*e*) Fractures of the cervical spine with paralysis of the diaphragm may require care in a respirator after the deformity of the neck has been corrected and the neck has been immobilized.

7. In a few instances there may be an indication for late operative intervention in the following conditions:

(*a*) Callous encroachment in the spinal canal giving slowly increasing neurologic signs.

(*b*) Callous encroachment on the spinal roots giving intractable pain not helped by injection of the roots. Such patients may require rhizotomy or chordotomy.

(*c*) Herniation of the intervertebral disk giving back pain, associated neurologic signs and roentgen or myelographic evidence of herniation of the disk.

(*d*) Hypertrophy of the ligamentum flavum with increasing pressure on the spinal cord.

(*e*) Post-traumatic adhesive arachnoiditis.

In our experience, it is well to remain optimistic of the recoverability of function following what even at first sight appears to be severe injury to the spinal cord. The physician has less reason to be optimistic in cases of flaccid paraplegia and the presence of the Gordon Holmes slow flexion reflex. Paradoxically, the presence of a Babinski sign in the first three weeks after severe injury to the spinal cord is a good omen.

410 East Fifty-Seventh Street.

ABSTRACT OF DISCUSSION

DR. F. C. GRANT, Philadelphia: I agree with the conservative attitude taken by Drs. Wortis and Sharp in the treatment of spinal fracture complicated by injury to the cord itself. This is particularly true in cervical fracture dislocation with cord damage. Our series of such cases with total cord injury, 31 in all, were reviewed. Thirty patients were operated on and none recovered. It is my belief that no patient with vertebral injury complicated by cord injury should be operated on regardless of the level of the lesion and regardless of whether the injury to the cord is complete or partial unless repeated neurologic examinations reveal a progressive lesion. This may seem to be a radical point of view. In certain cases in which roentgen ray studies show a decided narrowing of the bony canal, laminectomy may be indicated for relief of pressure, particularly if lumbar puncture reveals a partial or complete block. But even in such cases hyperextension and traction will help a great deal and the difficulty of caring for the operative wound will be avoided. Traction on the skull, either by the Crutchfield tongs or, if the tongs are not available, bilateral trephination and the use of piano wire through the trephine holes, is very effective in reducing dislocations or fractures with or without narrowing of the canal. A patient will tolerate 20 to 25 pounds weight to produce traction by these methods, far more, of course than could be used with the old fashioned jury mast. Reduction is possible by this means plus hyperextension even in low thoracic or lumbar regions. I am not opposed to lumbar puncture. The information to be obtained from this source as to the relationship between the cord and the vertebral canal may be important. Certainly with a cord injury and no evidence of block, no surgical indication exists. If a block, partial or complete, is demonstrable, the necessity for laminectomy will be seriously considered by some surgeons. The roentgen ray studies are also important, although just how much movement in these cases is justifiable to obtain the films is often questionable. The question as to the cause for the priapism shown in cervical cord injuries interested me. In chordotomy cases in which the pain level lies below the level of the fourth thoracic, pressure on the testicle is always painful although the skin of the scrotum and adjoining pelvic areas may be entirely analgesic. However, in a few cases of high cervical chordotomy, or in working with spinal anesthesia, the pain on testicular pressure seems to be abolished when the sensory level reaches to or above the first thoracic. The sympathetic afferent fibers enter the spinal cord below this level. Hence the pain on pressure over the testicles seems to be sympathetic in origin.

DR. LEWIS J. POLLOCK, Chicago: The contribution of Dr. Wortis and Dr. Sharp is especially timely now when we are instituting measures designed for national defense. When one recalls that until World War I the concept of Bastian was accepted that the distal segment of a severed cord is without function, the value of careful observations of spinal cord injury in civil practice is emphasized. Comparison of the injuries that I and others saw in the World War with these civil practice cases has interested me. When injuries were produced by missiles, not only the spine was injured but many other tissues as well and the mortality soon after the injury was very high; therefore the statistics relating to those cases which were seen chiefly in the equivalent of base hospitals differ widely from those which are reported now. Since grave injuries to the neck were frequently and immediately fatal, a large number of the cases reported dealt chiefly with injuries to the thoracic and to the lumbosacral spine. The mortality reported by Dr. Wortis and Dr. Sharp in their series was 17.5 per cent. Excluding those cases in which death occurred before evacuation to hospitals in zones of supply, Barré reported on 350 or more cases with only 85 survivals. The frequency in the war of spinal

cord and root injuries was about 1 : 10 as compared to peripheral nerve injuries. Some of the things that were noted in the war in relation to the localization of lesions have not been reported in civil injuries. For example, it was of interest to note that high cervical cord injuries were accompanied by hyperthermia, and low cervical cord injuries were often accompanied by hypothermia, slow pulse and low blood pressure. I am in agreement with the conservatism which has been recommended for the surgical treatment of these conditions. I think, however, as Dr. Grant has stated, that there may be some instances in which it may be of service. Manometric studies will probably determine those in which it is. Certainly unless one has definite evidence of either the impingement on the spinal cord by fragments or missiles or a spinal fluid block, there is nothing to operate on. Cauda equina lesions respond much as do peripheral nerves. The lesions recover spontaneously, leaving only small residues and, therefore, the indications for operation there are even less than they are in operation on the spinal cord. I have seen an instance in which a block was demonstrated and it was decided to wait a few days or a week and repeat the examination, and at the end of that time it was found that the block had disappeared and then at the expiration of ten days electric examination of the muscles showed that there was no reaction of degeneration; therefore, wisdom was exercised in not operating in these cases.

DR. EMIL SELETZ, Los Angeles: I have observed some 350 of these cases of fractured spine with involvement of the spinal cord. All the patients, most of whom were seen at the Los Angeles County Hospital, had neurologic signs, because those that did not were not admitted to the neurosurgical service. We have all seen spinal cord injuries two to ten years old, and many of these patients still complain of acute pain in the back, muscle spasm, and have a varying amount of spinal cord damage with neurologic findings. In those patients that could not be relieved by medical means and in whom when surgery was performed it was noted that movement of the fractured elements was still present, there had not taken place a solid bony fusion. The thought occurred that it was probably this movement that eventually gave rise to the hypertrophy of the ligamentum flavum, and possibly also that this movement helped to cause a protrusion of an injured intervertebral cartilage. It seemed logical, therefore, in these cases to fuse the spine before closing. The procedure can be made short by using the spinous processes removed at laminectomy instead of a tibial graft. When the pain in these cases was acute we performed a rhizotomy, cutting only the roots that seemed to be involved in the injury. After the wound healed we applied a light body cast, so that the patient was out of bed within a few weeks and thus eliminated long drawn out hospitalization. For the past two years I have done this in a select group of cases. Do not misunderstand that this is routine procedure at the General Hospital. It is my personal opinion. A patient with cord injury frequently gets an acute distention of the abdominal wall and of the intestine. I have found it most helpful to use the old fashioned belly binder early and in addition I have found that a Harris flush given in the proper way plus antispasmodic drugs has been of great help in relieving as well as preventing acute abdominal distention.

DR. S. BERNARD WORTIS, New York: We want to leave the impression that we do not hesitate to do a lumbar puncture manometric test if necessary. But we believe that this is not necessary as a routine procedure in every case of a fractured spine. All these cases we reported were at Bellevue Hospital and were seen by a neurologist. We would like to emphasize that the pathologic change of severe cord injury consists largely of hemorrhage into the gray matter of the cord, which the surgeon cannot help. We also would like to emphasize that the extradural operation is to be recommended when needed. As regards Dr. Seletz's discussion, in our series of two hundred spine fractures it was found necessary to do a spinal fusion in only three in the chronic stage. These all presented progressive neurologic signs as a chronic complication of the acute spine injury. We do not approve of nor would we recommend the routine spine fusion of all spine injuries.

FURTHER EXPERIENCES WITH THIOCYANATES

CLINICAL AND EXPERIMENTAL OBSERVATIONS

M. HERBERT BARKER, M.D.
HOWARD A. LINDBERG, M.D.
AND
MAURICE H. WALD, M.D.
CHICAGO

Following our original report [1] on the blood level control of administration of thiocyanate in the treatment of hypertension, there have been five [2] publications and two reports [3] which are in essential agreement with our original statements that blood pressure can be reduced and symptoms alleviated in more than 50 per cent of patients with hypertension provided that the criteria for adequate cyanate control are observed. The criteria of cyanate response used in our clinic are (1) general clinical improvement, (2) a substantial reduction in blood pressure (30 to 60 mm. systolic and 20 to 40 mm. diastolic) associated with (3) a blood cyanate concentration of from 8 to 12 mg. per hundred cubic centimeters.

The large number of questions that we have received from all parts of the country indicate that thiocyanate is being used extensively for the treatment of hypertension, and for this reason we feel that certain remarks regarding our clinical and experimental observations might be in order. We wish to review the uses and dangers of cyanate therapy experienced in our clinic and in private practice during the past ten years. During this time 246 patients have been on continuous, closely controlled thiocyanate therapy for intervals ranging from two to ten years.

INDICATIONS

We have employed thiocyanates in the treatment of hypertension under the following circumstances: first, when the other usual clinical measures have failed (social and psychiatric adjustments, sedation and prolonged rest, cardiovascular support, vasodilators and the like); second, when the patient's condition is either uncontrolled by the measures just mentioned or excessive sedation is necessary to control his symptoms so that he is physically, mentally and socially incompetent to carry on his daily routine, and, finally, after surgical treatment which has been unsuccessful. It is obvious, therefore, that close observation and clinical judgment must be exercised in the use and interpretation of such a program as that of cyanate therapy.

In 1929 a simple technic as described by Schreiber [4] for determination of cyanate in the blood was modified so that adequate control of dosage could be obtained in patients receiving sodium or potassium salts of the thiocyanates without suffering significant toxic effects. Experience during the past ten years in our cardiorenal

From the Department of Medicine, Northwestern University Medical School, and the Bettie Soper Clements Ward of Passavant Memorial Hospital.

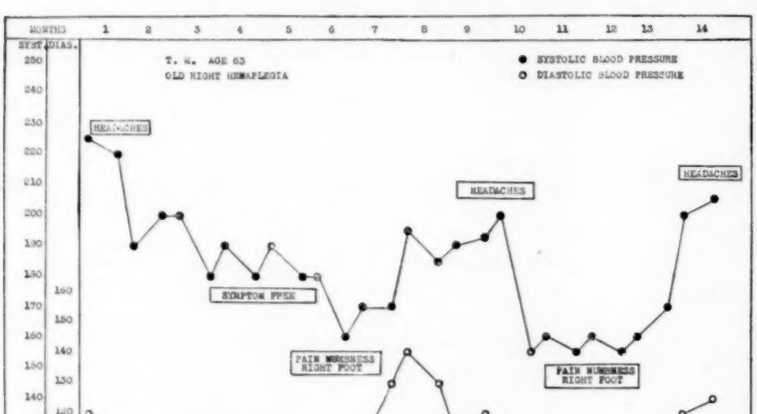
Read before the Section on Pharmacology and Therapeutics at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 4, 1941.

1. Barker, M. H.: Blood Cyanates in Treatment of Hypertension, J. A. M. A. **106:** 762 (March 7) 1936.
2. Massie, Edward; Ethridge, C. P., and O'Hare, J. P.: New England J. Med. **219:** 736 (Nov. 10) 1938. Robinson, R. W., and O'Hare, J. P.: ibid. **221:** 964 (Dec. 21) 1939. Covey, G. W.: Nebraska M. J. **25:** 363 (Oct.) 1940. Griffith, J. Q., Jr.; Lindauer, M. A.; Roberts, Ella, and Rutherford, R. B.: Am. Heart J. **21:** 90 (Jan.) 1941. Blaney, L. F.; Geiger, A. J., and Ernst, R. G.: Yale J. Biol. & Med. **13:** 493 (March) 1941.
3. Kurtz, C.: Am. J. M. Sc., to be published. Bunn, William: Ann. Int. Med., to be published.
4. Schreiber, H.: Biochem. Ztschr. **163:** 241, 1925.

clinic at Northwestern University indicates that a blood cyanate concentration of from 8 to 12 mg. per hundred cubic centimeters gives the best sustained symptomatic relief and improvement in blood pressure without endangering the welfare of the patient. Likewise we are able to determine whether the dosage is adequate or whether the patient is taking his prescribed dosage. It would be fortunate if there were a similar accurate measure for determining the proper dosages of such drugs as digitalis or the arsenicals. Studies [5] of the rate of excretion of the drug show that there may be an individual variation of 400 per cent, which emphasizes the importance of having a method for evaluating the dosage. The same patient shows variations of concentration depending on fluid balance, which varies with the season, with fluid intake and with physical activity.

DOSAGE

In general, we begin the treatment by giving the patient 0.3 Gm. (5 grains) of potassium thiocyanate daily in either liquid or tablet form. The blood cyanate determinations are then taken at weekly intervals for from four to six weeks. This dosage is decreased if the blood pressure drops sharply during the first one or two weeks of treatment or if the symptoms of fatigue and depression are great enough to interfere with the patient's sense of well-being. However, the dosage may be doubled during the second or third week if the blood concentration has not reached the level of 6 mg. per hundred cubic centimeters, if there has been no blood pressure change and if the patient has no toxic symptoms. Throughout the whole course of cyanate administration the dosage may be constantly varied—either increased or decreased or temporarily discontinued—depending on the patient's symptoms, blood pressure and blood level concentration. It should be emphasized that symptoms of fatigue, somnolence and mental retardation are often met during the first four to six weeks of administration. They are not, as a rule, indications for discontinuing therapy, although the dosage may be moderated. These symptoms usually disappear entirely after four to six weeks of continued treatment. However, one must not focus one's attention so closely on reduction of the blood pressure that the patient and his disease complex as a whole are neglected.



Clinical course of a patient aged 63 with old right hemiplegia. The black dot indicates the systolic pressure and the circle the diastolic pressure.

The systolic blood pressure may drop during the first two to four weeks of therapy, while the diastolic pressure may not show a persistent reduction for from three to four months. An occasional patient will show no response of any kind for three or four months of continuous therapy. Excellent results may be obtained in all age groups and under many circumstances, but caution must be exercised in the patient with poor renal function because of his sharply reduced clearance of cyanate. Also in the group of patients with advanced arteriosclerosis a rapid fall in blood pressure may result in vascular occlusions. Once the symptoms, blood pressure, dosage and blood cyanate level have been satisfactorily correlated, the patient should return for check-ups at intervals varying from one to three months.

Our best clinical results have been obtained in patients with hypertension whose erythrocyte count is high, whose sedimentation rate is slow and whose blood pressure may be shown to be of the fluctuant type. This group includes the commonly discussed plethoric, emotional and menopausal varieties. Little or no benefit has been obtained in severe hypertension with fixed blood pressures in which blood counts are below 4.5 million with a progressing anemia and a rising sedimentation rate. Such cases may be classified as probable or actual malignant hypertension.

An occasional patient with advanced malignant hypertension exhibiting cardiac or renal failure may experience definite improvement for months or years, so that even this group might be given a thorough trial with cyanate therapy. In rare instances in which the malignant hypertension had produced cerebral symptoms of excitement, hallucinations, delirium and blindness, cyanate therapy has resulted in a remission which has lasted for weeks or months. We should like to emphasize here that not only in the malignant group but in any case of hypertension in which there are signs of cardiac decompensation an attempt should be made first to improve the cardiac function before cyanate therapy is begun. A gradual increasing blood pressure in a person with hypertension may be the first sign of cardiac failure, and as compensation takes place the blood pressure may fall to its basic hypertensive level. When this level is reached, cyanate therapy may be commenced.

Of 246 patients who had been previously uncontrolled by standard therapeutic measures for periods ranging from two months to two years, 47.5 per cent have shown persistent improvement in the symptoms, clinical status and blood pressure on thiocyanates for over a two to eleven year control period.

In addition to these figures, 19.5 per cent have shown significant reductions in blood pressure without any definite changes in their clinical status. Another 9 per cent have shown symptomatic improvement without alteration of blood pressure. These combined groups thus show that 76 per cent of our patients have received some benefit of one form or another from cyanate therapy.

5. Wald, M. H.; Lindberg, H. A., and Barker, M. H.: Toxic Manifestations of Thiocyanates, J. A. M. A. **112**: 1120 (March 25) 1939.

TOXICOLOGY

No toxic deaths have occurred in our series during the past ten years. Only eighteen patients have shown persistent toxic manifestations or intolerance necessitating the discontinuance of the drug. As previously reported,[1] hemiplegia developed in a man aged 68 whose blood concentration had risen to 35 mg. per hundred cubic centimeters, and 1 patient suffered from delirium and hallucinations with a blood level of 45 mg. per hundred cubic centimeters which followed his drinking the drug from the bottle without measuring the prescribed teaspoon.

Two elderly patients had symptoms of angina when their blood pressure dropped below 150 mg. of mercury. Electrocardiograph tracings were normal during this period of time when anginoid distress was present. The angina disappeared as the blood pressure was allowed to rise to 165 mm. and above. One patient who had had a hemiplegia two years before cyanate therapy had symptoms and signs of his old hemiplegia when the blood pressure was allowed to fall to 150 mm. of mercury. These symptoms also disappeared when the cyanate was discontinued and the blood pressure returned to 180 mm.; this patient's clinical course is shown in the accompanying chart.

Four elderly patients with blood concentrations above 20 mg. per hundred cubic centimeters had extreme depression, word aphasia, slurring speech, unsteady gait and disorientation. All these symptoms disappeared when the drug was discontinued. Thus no patient in our series has shown severe intoxication unless the blood cyanate level has been 20 mg. per hundred cubic centimeters or above. It is not unusual, however, to see fatigue, secondary anemia and a dry scaling skin appear after many months of continuous ingestion of cyanate. If the red cell count drops below from 3.8 to 4 million, we have usually discontinued the drug until a count of from 4.25 to 4.5 million is again attained. We would rather see our hypertensive patients have a low normal or even a slightly subnormal red count than to maintain the usual high normal count.

The dermatitis, which may manifest itself in several ways (cracking at the corners of the eyes and mouth, scaling of the skin behind the ears or on the back of the neck, forearms and legs, back and chest or a papular bromide-like rash of the face, back of hands and back), will disappear after the drug has been stopped and may not reappear when thiocyanate is resumed. Severe forms of exfoliative dermatitis have not been experienced. An occasional large thyroid develops (11 cases) or a myxedematous facies is seen (9 cases) with basal metabolic rates in the neighborhood of minus 10. All these cases have shown recovery with 1 to 2 grains (0.065 to 0.13 Gm.) of thyroid daily within two weeks.

After many months or years of continuous therapy an occasional patient presents the clinical picture of asthenia, loss of weight, generalized muscular wasting and severe anemia which usually attend the downhill progress of widespread vascular disease even though the blood pressure during this period of time has been satisfactorily controlled.

None of the patients who were successfully managed with thiocyanate have been offered surgical treatment. No patient who has failed to show a response to thiocyanate therapy has shown any improvement after supradiaphragmatic and infradiaphragmatic splanchnicectomy. As reported elsewhere, patients with a fairly fluctuating type of blood pressure were submitted to surgery because very large doses of the salt were necessary to cause even modest blood pressure response.[6] Splanchnicectomy in itself did not cause a drop in blood pressure. However, when this cyanate was again started a satisfactory blood pressure response—particularly that of the diastolic pressure—was noted. These patients were then carried comfortably on the usual cyanate dosage with normal blood concentrations. We have observed similar responses to splanchnicectomy followed by administration of thiocyanate in dogs in which hypertension was produced by the Goldblatt clamp. In respect to cyanate distribution in the body, it has been shown by Goldring and Chasis,[7] Healy [8] and others that the drug was equally distributed in the various tissues. We have confirmed these observations in man, dogs and rats.[5]

Carrying these experiments further, severe cyanate intoxication in dogs (40 to 65 mg. per hundred cubic centimeters blood concentration) shows no pathologic changes in any organ except damage to the liver and bone marrow, resembling benzene poisoning. The only additional changes shown in the dogs were reduced red cell counts, blood cholesterol and total serum protein findings, which could be explained on the pathologic change mentioned.[9]

Results of Thiocyanate Treatment of Hypertension: Two to Ten Year Control

Type of Response	Private Patients		Clinic Patients		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Symptomatic relief only	14	7.7	9	14.0	23	9.6
Blood pressure reduction only	36	19.9	12	18.4	48	19.5
Blood pressure reduction and symptomatic relief	94	51.9	23	35.4	117	47.5
No response	35	19.3	20	30.7	55	22.3
Response with toxicity	4		4		8	
No response with toxicity	9		1		10	
Worse on cyanate	5		2		7	
Total	181		65		246	

CONCLUSION

Our impression concerning thiocyanate therapy in hypertension after having closely observed 246 patients for periods ranging from two to ten years may be summarized thus:

1. Controlled thiocyanate therapy has relieved symptoms and reduced blood pressure in 47.5 per cent of patients with hypertension.

2. Blood pressure reduction is effective only by adequate blood thiocyanate concentration of from 8 to 12 mg. per hundred cubic centimeters.

3. Improvement is to be expected in from two to four weeks. However, three months of peristent therapy may be required.

4. A maintenance dose must be individualized, depending on symptoms, blood pressure response and blood thiocyanate concentration (8 to 12 mg. per hundred cubic centimeters).

6. Davis, Loyal, and Barker, M. H.: Ann. Surg. **110:** 1016 (Dec.) 1939.

7. Goldring, William, and Chasis, Herbert: Thiocyanate Therapy in Hypertension: Observations on Its Toxic Effects, Arch. Int. Med. **49:** 321 (Feb.) 1932.

8. Healy, J. C.: New England J. Med. **205:** 581 (Sept. 17) 1931.

9. Lindberg, H. A.; Wald, M. H., and Barker, M. H.: Am. Heart J. **21:** 605 (May) 1941.

5. The dosage varies in any one individual according to renal clearance, fluid balance, circulatory efficiency and seasonal variations.

6. Determination of the thiocyanate in the blood is the only safeguard to dosage control.

700 North Michigan Avenue.

ABSTRACT OF DISCUSSION

DR. JOHN R. WILLIAMS, Winston-Salem, N. C.: In the last few years a new concept of essential hypertension has developed. Hypertension is now classified into types on the basis of cause. The three general classifications are hypertension due to primary diseases of the kidney, that due to neurologic disease and that due to endocrine disorders. It is important to distinguish these types, because the group of patients who have hypertension based on or aggravated by nervous instability are helped in large measure by sedatives, rest and reassurance. Psychotherapy has been used with some success in treating them. It has been difficult to be sure which patients fall into this group.

THE PAROTID GLAND

ITS COMMON DISORDERS

A. C. FURSTENBERG, M.D.

ANN ARBOR, MICH.

Because there is a wide range of printed material available on diseases of the salivary glands, it is a great temptation in discussing this problem to quote from numerous references and to pose the points of view of many workers who have made creditable contributions to the literature. I wish it were possible to pay tribute to the authors who have preceded me and to do justice to this subject by expressing their critical judgments, but space will not permit such a comprehensive review of this topic.

While the secretory glands that discharge their products into the oral cavity are recognized to be the parotid, submaxillary and sublingual glands, the glands of Blandin and Nuhn, the palatal glands, the Moore glands and numerous small mucous glands scattered over the buccal mucous membrane and floor of the mouth, I shall limit my discussion to but one structure, namely the parotid gland. A finished work on this subject is obviously impossible, but I shall endeavor to submit briefly pertinent observations on the parotid gland which may be helpful in formulating conclusions that will throw significant light on the pathologic conditions which involve the entire system of secretory glands.

When one takes into consideration the frequency with which the parotid gland becomes the seat of disease, its susceptibility to practically all the conditions that are common to other glands in this system and the principles which it can teach in the therapy of disorders of the secretory gland, the practicability of this point of view may not seem too far fetched.

The embryology and anatomy of the parotid gland recorded in standard anatomic textbooks call attention to the fact that the gland is lateral to the superficial layer of cervical fascia, the internal carotid artery, the facial vein and the facial nerve. A study of the embryologic development of the gland clearly reveals that these structures are invariably medial to the important ducts of the gland from which branching and budding occur to produce the adult structure. Moreover, it must be borne in mind that the parotid gland has a number of extensions or prolongations which come into relation with neighboring tissues that often exert an important influence on the clinical behavior of pathologic processes within and about the gland. Students of this subject will do well to investigate the embryologic development of the parotid gland and grossly identify its prolongations before giving attention to the clinical aspects of diseases that are common to this structure.

From the University of Michigan Medical School.

Read before the Section on Laryngology, Otology and Rhinology at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 6, 1941.

INFECTIONS

From an etiologic standpoint, the occurrence of inflammatory processes within the parotid gland are recognized from three important sources. First, parotid abscesses resulting from foreign bodies in the duct particularly the salivary calculus; second, infections of the parotid gland occurring as a complication of abdominal operations, and third, inflammatory diseases arising as the result of direct extension from neighboring infections. The first causative factor, namely, the foreign body, of which the salivary calculus is the classic example, occurs less frequently in the parotid than in the submaxillary gland. When, however, its presence is felt to the extent of occluding Stensen's duct, the characteristic symptoms are sudden sharp pain when the salivary flow is stimulated, painful swelling of the gland and later the typical signs of suppuration with general reactive symptoms. Pus may be expressed from the duct, or palpation with the finger along its course may reveal the location of the offending calculus. Often the stone is felt with a probe introduced into the duct or is clearly visualized in a roentgenogram, particularly when augmented by the injection of a radiopaque substance.

Treatment calls for a simple internal operation which offers no important technical difficulties. A 2 per cent solution of procaine hydrochloride is injected about the papilla of the duct and along its course, the duct probed and then split open until the calculus can be grasped and removed. The duct mends and restores its patency in a phenomenal manner, and the risk of producing a salivary fistula is of no concern when this procedure is employed. When possible, the operation should be performed in the interval between acute exacerbations of the infection. It is well to treat the patient conservatively, if possible until the acute inflammation has subsided, before the surgical measures for removal of the stone are instituted.

I have never found it necessary to excise the entire parotid gland for multiple calculi and their associated inflammatory reactions, although the literature contains several references to recurring phlegmonous processes which called for total extirpation of the parotid gland even at the cost of destruction of the facial nerve. In several instances, however, I have made numerous incisions into the parotid gland for the removal of multiple calculi, and fortunately the few patients thus treated went on to satisfactory recoveries. One need only reflect the skin and subcutaneous tissue from the parotid gland, identify the stones by palpation and cut into the substance of the gland to expose them and thus effect their removal. The facial nerves are deeply situated in the tissues of the gland, so that it is possible to do considerable damage to the superficial parts without grave danger of injuring these structures. It must be remembered, however, that when one is dealing with multiple stones within a gland which has

been the seat of numerous inflammatory exacerbations the parenchyma is likely to have suffered serious injury and that the simple removal of the calculi may not be followed by a rehabilitation of the gland structure. In such cases the prognosis must be guarded. The possibility of a recurrence of the stones is ever present, and there is reason to doubt that the gland will ever make a complete recovery. Under such circumstances it may seem wise to attempt the more or less complete removal of the parotid gland, but if this operation is instituted every effort should be made to tease out the fibers of the facial nerve and protect as many of them as possible. It is amazing frequently to observe in removal of large noninfiltrating parotid tumors how extensively the gland may be excised with preservation of most of the important branches of the facial nerve.

Come now to the second causative factor in parotid inflammation to which reference has already been made, namely "in connection with injury or disease of the abdomen or pelvis." Sir William Osler [1] called attention to these factors and since his observations were recorded in the early editions of his treatise on internal medicine other authors have described the occurrence of parotid infections after major abdominal operations. It is doubtful whether there is any direct connection between an abdominal or pelvic operation and a parotid abscess; nevertheless, the sequential occurrence of the latter in isolated instances cannot be questioned. The explanation probably lies in the fact that the patient is dehydrated. I have never seen a parotid abscess develop in a patient whose fluid requirements were adequately fulfilled. Dehydration is constantly in evidence, and it is quite conceivable that the dry gland devoid of a protective flow or secretion may become infected by retrograde extension of mouth flora through the duct, particularly in persons with poor dental hygiene and septic oral cavities.

Perhaps too there is another factor which needs to be emphasized in this type of parotid abscess, namely the injury that may be done the parotid gland by the anesthetist who forcibly places his fingers under the angles of the mandible to hold the jaw forward during anesthesia. How often have patients been heard to complain bitterly of the soreness of their jaws after some prolonged surgical procedure in which the anesthetist caused firm pressure back of the ramus of the mandible. This practice may in my opinion injure the parotid gland and devitalize it to the extent that it becomes a fertile soil for the growth of infection.

And finally I come to the third important causative factor in the production of parotid abscess, namely the extension of infection from neighboring structures. In this connection it is essential to call attention to the anatomic relationships of the parotid gland and particularly its association with the pharyngomaxillary fossa. Through this space which is recognized to have important influences on the clinical behavior of suppurative processes in the neck, the inner prolongation of the parotid gland is open to infection on all sides. By this route it is exposed to the invasion of infection from the cervical vertebra and by inflammatory processes which originate in the retropharyngeal or peritonsillar regions. How frequently has the physician been startled by the appearance of a parotid swelling several hours or days after the onset of a peritonsillar or retropharyngeal abscess and wondered what influences were at work to give rise to this association. The interposition of the pharyngomaxillary fossa between the pharynx and the inner prolongation of the parotid gland (the carotid lobe) is obviously responsible for this phenomenon, which occurs frequently enough to be regarded a clinical entity. By the same token, infections originating in the parotid gland, possibly secondary to a furunculosis of the external auditory canal or from any other source, may extend medially through the inner prolongation to the pharyngomaxillary fossa and thence to the structures of the pharynx. One must not lose sight of the important anatomic relationships of the inner prolongation of the parotid gland when dealing with suppurative processes within this structure.

TREATMENT

The most important factor in the palliative treatment of parotid abscess is hydration. It is absolutely imperative that the patient be given sufficient fluid to promote normal function of the excretory organs of the body. It is a matter of scientific fact that the average adult person requires approximately 3,500 cc. of fluid in twenty-four hours.[2] Obviously more is needed when a patient is vomiting or bleeding or when there are copious discharges from infected wounds in the body. If the patient is not receiving an adequate quantity of fluid each day by mouth it is necessary to administer it by the intravenous route. Other palliative measures of lesser value are hot external dressings, suberythemal doses of roentgen rays, gentle probing of the duct, diathermy for the relief of pain and iodine in the form of large doses of compound solution of iodine.

When however there is definite evidence of suppuration, the abscess must be incised and drained. Too frequently this procedure is unnecessarily delayed in the hope that the palliative measures just enumerated will bring about a satisfactory recovery. Unfortunately suppurative processes of the parotid gland do not respond to simple therapeutic measures, and belated surgical procedures not only favor serious complications but frequently jeopardize the life of the patient. More and more emphasis must be placed on the early recognition of suppurative processes of the parotid gland and the institution of prompt surgical measures for adequate drainage.

All the palliative measures mentioned with the possible exception of hydration bear a minor relation to that conviction which governs my principles of therapy, for the parotid gland, namely the necessity of massive drainage when the gland is the seat of an abscess. I am unwilling to compromise with any other recommendation when there is evidence of pus in the gland. The incision for this purpose begins above at the level of the zygoma and extends downward in front of the external auditory canal, parallel with the ramus of the jaw and forward beneath the angle for a distance of 2 or 3 cm. along the inferior margin of the mandible. The skin and subcutaneous tissues are reflected forward, thus exposing the entire lateral surface of the gland and facilitating massive drainage of this structure. There need be no apprehension in making numerous incisions in the gland, once it has been exposed widely in this manner, because the fibers of the facial nerve are deeply situated and far removed from the risk of injury.

1. Osler, William: The Principles and Practice of Medicine, New York, D. Appleton-Century Company, Inc., 1892.

2. Coller, F. A., and Maddock, W. G.: Water Requirements of Surgical Patients, Ann. Surg. **98**: 952 (Nov.) 1933.

The rationale of this procedure becomes obvious to the person who has temporized with surgical measures of minor proportions in the treatment of this condition. A mere stab into one of the compartments of the gland rarely suffices to cure the patient. There is a great tendency for suppurative disease of the parotid gland to spread from one interstice to the other, and any attempt to follow the pockets of pus as they develop, and drain them by stab incisions, merely leads to numerous painful operations and an unnecessarily prolonged convalescence. Wide effective drainage in a one stage operation minimizes the sufferings of the patient and leads to results much more heartening than those obtained by more conservative surgical procedures. At the risk of pointing out the obvious, I might add that chemotherapy may be used locally in the wound and be administered for its general effect in accordance with the extent of the infection or its complications.

TUMORS

Any discussion of the subject tumors of the parotid gland calls for a consideration of that bizarre lesion which is termed the mixed salivary gland tumor. This is in accord with experience because it is found that the vast majority of neoplasms originating within the parotid gland fall into this classification. Since July 1, 1937, I have observed 72 patients with parotid gland tumors, 36 of which were diagnosed the mixed salivary gland type, 4 were sarcomas and 32 demonstrated the pathologic changes of carcinoma. There is strong evidence, however, in support of the view that those lesions which were classified as carcinomas represented the terminal malignant changes of a mixed salivary gland tumor. Likewise, the four sarcomas probably represented malignant alterations within the stroma of a similar lesion. In other words, it is highly probable that with the exception of a few adenocarcinomas which originate primarily within the glandular structure of the parotid gland, the greater number of carcinomas of this organ are at some time early in their development a relatively benign mixed gland tumor.

Aside from the pathologic indications of this association, the clinical history often supports this view. The patient frequently states that the lesion put in its appearance sometime during the third or fourth decade of life, grew slowly or not at all for many years and finally burst forth with a flourishing growth which led to the surgeon's recommendation to remove the parotid gland. When these lesions are found to be carcinomas of a far advanced character with no pathologic signs of having originated within a mixed salivary gland tumor, there is still supporting evidence in such a history that a neoplasm of this type gave rise to the malignant lesion. It goes without saying that a rapidly proliferating carcinoma occurring as such from the onset would not run a course of five to ten years or longer without destruction of extensive areas of tissue or the life of the patient.

The precise origin of mixed tumors is not clearly understood, although it is suspected that they are pathologic lesions derived from embryonal rests, aberrant structures or superfluous collections of cells. The mechanical hypothesis, which in a broad sense ascribes the derivation of these lesions to some disturbance or irregularity of the mechanics of embryonic development, is the one usually accepted. From my own observations and those of others the mass of evidence, although speculative and devoid of scientific proof, leads to the opinion that mixed tumors develop from the proliferation of mesoblastic tissue which has been displaced during embryonic growth or which fails to attain adult characteristics.

CLINICAL MANIFESTATIONS

This problem is of pressing interest to the otolaryngologist because these lesions are frequently observed in regions to which he gives special attention. They are not confined alone to the parotid gland but occasionally arise within the tongue, hard palate, maxillary sinuses and the ethmoidal labyrinths, developing to proportions which destroy life. The mixed tumors are usually observed in young adults, grow slowly and cause very little inconvenience, so that surgical relief is seldom sought until an average period of seven years has passed since the new growth was first discovered. The tumors bear no etiologic relationship to acute parotitis, calculi in the gland or the chronic infective granulomas. In fact, there appear to be no extrinsic factors associated with these lesions, which perhaps lends further support to the view that they represent some disturbance in embryonic growth. One point that I wish to stress particularly is that those neoplasms which on palpation feel soft and boggy contain abundant parenchyma of an embryonic character and are usually found to be of a malignant nature. Conversely, those tumors which are hard consist of fibrillar connective tissue and bone and are the group among which the benign tumors are found.

Unhappily these lesions are vicious and cruel in their clinical behavior. They appear usually in young adults as a benign lesion which grows insidiously for several years but resolutely in the direction of a malignant change which eventually destroys the life of their host. Often years after what appeared to be a successful operation for the removal of a mixed tumor the lesion returns with alterations which depart further from their original benign state. With each recurrence the lesion accretes changes of a highly malignant character. One cannot emphasize too strongly Dr. Weller's dictum that the fate of the patient lies in the hands of the first surgeon. If he is successful in removing every vestige of the neoplasm, and this is frequently possible in the early encapsulated stages of the disease, there is little danger of a troublesome recurrence. If, however, portions of the neoplasm are allowed to remain, the growth which subsequently recurs is highly malignant and further surgical attempts are usually futile. It is this aspect of the clinical behavior of these lesions that should be kept constantly in mind to the end that the first surgeon will not fail in his responsibility to eradicate the lesion so completely that no tissue of potential danger remains in the field of operation.

PATHOLOGY

The microscopic structure of the mixed salivary gland tumor is varied and bizarre, which accounts for the term mixed tumor applied to these neoplasms. The lesion may arise as a myxochondroma composed of myxomatous material which stains like cartilage, groups of epithelial cells often assuming a glandular architecture, fibrillar connective tissue with mucin and occasionally lymphoid tissue and bone. As the tumor grows and particularly when it recurs after surgical intervention, frank carcinomatous alterations occur which reveal on successive examinations a transition from a com-

paratively benign chondromatous tumor to a rapidly proliferating epithelial neoplasm, highly malignant in character.

TREATMENT

The treatment is surgical. Before attacking the lesion I believe it is well to bear in mind that most of these tumors seem to originate within the inner prolongation of the parotid gland. In my series of cases this observation has been made so frequently that this portion of the gland is invariably exposed as the first step in our surgical approach. This phenomenon has occurred with such regularity that it seems almost certain that some embryologic explanation will be found to account for the site of predilection for these lesions in the parotid gland. The only reason that I can offer, admittedly based on somewhat desultory theory, is that the inner prolongation is the first part of the gland to be formed and that as the gland bud forces itself through young mesoblastic tissue cells, the latter are displaced or disturbed in such a manner that they do not subsequently develop adult characteristics. It appears to be definitely settled that the anlage of the parotid gland appears about the fourth week. The remainder of the gland, namely that portion immediately behind the temporomandibular articulation and in front of the external auditory canal termed the glenoid lobe and that portion at the posterior border of the mandibular ramus and on the inferior surface of the internal pterygoid muscle termed the pterygoid lobe, develops later, in all probability after the mesoblastic tissue through which the gland bud travels has had time to become more highly differentiated. I confess some trepidation in presenting this theory, but it seems to offer the only plausible explanation for the common location of mixed tumors in the carotid lobe.

Under general anesthesia (I prefer it to a local anesthetic in order that no response from the patient will interfere with a careful and radical dissection of the lesion) an incision 4 or 5 cm. long is made immediately beneath the angle of the jaw and is carried diagonally upward over the mastoid process. One will find it advantageous to carry the incision well up over the mastoid in order to free the auricle and facilitate its reflection forward in an effort to secure a wide exposure of the region of the carotid lobe. It will be found that the parotid gland lies immediately beneath the skin and subcutaneous tissue and that it is not covered by a dense layer of fascia so frequently described in anatomic textbooks. The tumor that is usually found to be encapsulated occupies a position inferior to the facial nerves and can be freely dissected from the deep recess occupied by the inner prolongation without danger of injuring these structures. The facial nerve emerges from the stylomastoid foramen immediately below the lobe of the ear and passes forward into the parotid gland where it divides into its various branches. This division, however, occurs above the region usually occupied by a mixed tumor, so that there need be little apprehension in making a radical attempt to remove every vestige of the new growth, even though it may extend inward under the angle of the jaw to depths which seem to offer undue hazards. Occasionally one will observe a rather large branch of the nerve passing parallel to Stensen's duct, but again this structure lies superiorly and can be retracted upward without danger of being injured.

The tumors are usually well circumscribed and are readily excised. The capsule is invariably thin, and every effort should be made not to rupture it and spill its contents into the open wound. If such an accident does occur, it is well to retract the edges of the wound after the remainder of the lesion has been excised and scrub the field vigorously with a coarse brush while copious quantities of irrigating fluid are poured into the operative field. The wound is then closed without drainage.

PROGNOSIS

The point has been stressed that when these lesions are entirely removed the prognosis for a cure is singularly good. If, however, any remnants of the new growth are allowed to remain, giving rise to a recurrence, further surgical efforts are usually in vain. The lesion recurs with advancing malignant alterations, invades the elements of the facial nerve, lymphatics, the walls of the external carotid artery and the temporal vein and spreads within the gland to such an extent that most radical dissections are seldom of any avail. Metatases may occur late in the disease and are usually found within the lungs.

Occasionally Stensen's duct is opened when the lesions are extremely large, with the production of a parotid fistula. The latter usually responds most satisfactorily to a few exposures to roentgen rays.

Authorities agree that mixed tumors are not radiosensitive and that irradiation is seldom a satisfactory method of treatment. While this probably is true, I am inclined to recommend roentgen therapy, particularly in those cases in which there is reason to suspect that not all of the lesion has been removed surgically. I have several patients under observation on whom roentgen therapy was employed after an operation which failed to remove the entire lesion who are alive and well without recurrence for periods exceeding five years. One must be guarded in condemning the roentgen rays in the treatment of these lesions because they appear to be radioresistant. Clinical experience alone impresses me with the opinion that roentgen therapy has a distinct place in the treatment of operative fields, particularly those which are regarded with suspicion after operations of doubtful effectiveness.

CONCLUSIONS

1. Prominent among the causative factors responsible for parotid inflammation are foreign bodies in Stensen's duct, particularly the calculus; injury or disease of the abdomen or pelvis, and extension of infection from neighboring tissues. Whatever the exciting cause of the abscess may be dehydration and injury are potent influences in its development and progress. The role of the pharyngomaxillary fossa as a receptor and distributor of infections of the neck must be recognized because of its intimate contact with the inner prolongation (carotid lobe) of the parotid gland.

2. One cannot avoid the hard way of treating parotid abscesses, namely by wide incision which secures massive drainage. It is the most charitable method in that it minimizes suffering and hastens the patient's recovery. A practice that must find a permanent place in the treatment of infections of the parotid glands is the institution of thorough hydration. There is no compromise for this therapeutic measure.

3. Mixed tumors of the parotid gland usually appear during young adult life and are probably the result of some disturbance in the mechanics of embryonic growth.

4. They are vicious in their clinical manifestation, in that they cause little inconvenience until they have

degenerated into a rapidly proliferating carcinoma. All early lesions probably contain malignant potencies.

5. The soft tumors are more prone to exhibit carcinomatous alterations than the hard firm ones.

6. Surgical intervention which accomplishes the removal of every vestige of the lesion is usually indicated. Hope of a cure rests with the surgeon who performs the first operation. If he can successfully eradicate every remnant of the tumor there is of course no danger or recurrence. When these lesions do recur, they usually present frank carcinomatous alterations, and further surgical efforts are ineffectual.

7. The weight of clinical evidence is in favor of roentgen therapy after the extirpation of these neoplasms, particularly when there is reason to suspect that a complete removal of the lesion has not been accomplished.

201 South Main Street.

ABSTRACT OF DISCUSSION

DR. WALTER B. HOOVER, Boston: Probing, palpation and simple roentgenologic examination will reveal in most instances the hard, radiopaque variety of calculus, but not all foreign bodies are of this quality. The diagnosis of disease of the parotid gland and its ducts can be greatly facilitated by the injection of radiopaque material into the ducts before the roentgenogram is made. Sialograms in cases of chronic infection are characteristic and show the ducts to be dilated, often tortuous and pocketed. In the cases of chronic infection without calculi, dilation of the opening of the duct and irrigations, with massage of the gland, may relieve the symptoms. If dilations fail to keep the duct freely open, a plastic procedure as advocated by Blair and Padgett is practical. In this procedure the opening and the buccal side of the duct are incised toward the gland and the lining of the duct sutured to the mucosa of the cheek. The chemotherapy of acute parotitis has been too limited for one to make dogmatic statements as to its effectiveness. In regard to surgical drainage, Dr. Furstenberg says "namely the necessity of massive drainage when the gland is the seat of an abscess. I am unwilling to compromise with any other recommendation when there is evidence of pus in the gland." I have seen a number of patients with acute parotitis in whom suppuration of the ducts occurred who recovered completely without other drainage. Each patient with acute suppurative parotitis is an individual problem and must be treated according to local conditions and general toxic reaction. When the patient is not unusually ill, hydration, roentgen radiation or radium packs, hot applications, oral hygiene and dilation of the duct may suffice without surgical drainage. When there is abscess formation in a localized area, with abatement in the general toxicity of the patient, local incision and drainage suffice. I was hoping Dr. Furstenberg would mention uveoparotitis, sarcoid or Heerfordt's disease, as this condition has received considerable space in recent literature. It is possible to confuse inflammatory masses in the parotid gland with tumors, and the possibility of their presence must be kept in mind. I should like to hear something about xerostomia and about excess secretions; also perhaps "mumps" should be mentioned. I agree with Dr. Furstenberg's statements concerning mixed tumors.

DR. GORDON B. NEW, Rochester, Minn.: In the treatment of the suppurative processes I feel as Dr. Furstenberg does that thorough drainage at one time is essential and that a cigaret rubber tube at least as big as the little finger should be used, as small drainage tubes are of little value. Through and through drainage frequently is used, and the tubes are sutured in position with silk so they cannot be displaced. When multiple through and through drains are employed the ends are held with safety pins so that they cannot come out. Thorough fixation of the drainage tubes in position is an essential part of the treatment. Drainage tubes should be left in place at least a week, in many cases two weeks and at times longer than that. They should not be removed until the condition subsides. Adenocarcinoma of the mixed tumor type is the most common malignant tumor seen in the parotid region, and in a recent study of cases at the Mayo Clinic it was found that it forms 65.5 per cent of all adenocarcinoma of the head and neck. I feel that surgical excision is the treatment of choice for the primary untreated tumors. Recently I reviewed the case histories of and sent follow-up letters to a group of 449 patients who had treatment at the clinic for adenocarcinoma of the mixed tumor type in the parotid region. Two hundred and thirty-seven had primary tumors that had not been treated before the patients came to the clinic, and 212 had recurring tumors after previous removal elsewhere. Of the patients who had primary tumors when excision had been employed, 97 per cent were well five years later, and of the patients with recurring tumors 85 per cent were living five years later. The statistics on the ten, fifteen, twenty, twenty-five and thirty year survivals bring out the same fact; that is, that the patient with a tumor that has not been operated on previously has a much better chance of a long period without recurrence. Of the patients treated twenty years or more previously, 81 per cent of those who had primary tumors lived twenty years while only 33 per cent with recurring tumors lived twenty years. One is dealing with a low grade type of tumor that is encapsulated to begin with, so the prognosis in general is good. Dr. Furstenberg has suggested roentgen therapy for the recurring tumors. I feel that the use of radium emanation seeds inserted directly into the involved region at the time of operation is of value, and for recurring tumors that are seen later also I place radium emanation seeds directly into the tumor in regions where removal would probably injure the facial nerve.

DR. A. C. FURSTENBERG, Ann Arbor, Mich.: In connection with Dr. Hoover's discussion, may I add that when the wound is open, as in the case described by him, an adjunct of real value to the treatment is the local use of chemotherapy. One may use sulfathiazole. The powder is packed into the wound daily. The powder is rather soluble, however, so that it must be used frequently. If one is dealing with the streptococcus, sulfanilamide, a less soluble powder, is employed. I am glad that Dr. New brought up the discussion of parotid tumors, because it covers approximately one-half of my paper. I was unable to refer to this subject because of the limited time allotted me. Dr. New has emphasized that most of the tumors in the parotid gland are mixed salivary gland tumors. They are probably teratologic in origin, and represent some irregularity in the mechanics of embryonic development. They are most vicious in their clinical manifestations in that they grow slowly and insidiously, but resolutely toward malignancy. At first they are comparatively benign in the form of myxochondroma; later, however, there is a great tendency for them to undergo malignant alterations, to invade the lungs and to destroy the life of the patient. Another point that should be emphasized is that "The fate of the patient rests in the hands of the first surgeon." If he is successful in removing all the lesion, there will be no recurrence later. If, however, he does not excise all the lesion, there is a great tendency for the neoplasm to recur, and with each recurrence it departs further and further from its original benign state and becomes more malignant. Dr. New emphasized the point adequately that surgical intervention seems to be the method of choice in the treatment of these lesions.

Filters for Public Water Supplies.—Chlorination of water supplies did not begin in the United States until 1908, and the first federal standard for drinking water set by the Public Health Service did not appear until 1914. Filters began to be used on a small scale early in the nineteenth century at Paris, and the first large sand filter was used in London in 1829. It was after 1875 before the use of filters spread throughout Europe. In the United States the first filters for a municipal water supply were built at Poughkeepsie in 1870, yet only 1.5 per cent of the country's urban population was supplied with filtered water in 1890, and by 1914 the proportion had only reached 40 per cent. Large sections of the United States are still without filtered water, with consequent danger to public health.—Stern, Bernhard F.: Society and Medical Progress, New Jersey, Princeton University Press, 1941.

THERAPEUTIC NERVE BLOCK

E. A. ROVENSTINE, M.D.
AND
H. M. WERTHEIM, M.D.
NEW YORK

"Therapeutic nerve block" is but one of the many ramifications of regional analgesia. The history of the introduction and development of perineural injections of analgesic and neurolytic agents for therapy coincides with that of similar types of injections to control the pain associated with surgical procedures. The use of surgical analgesic nerve blocks has eclipsed by far similar procedures employed to cure or alleviate pain or symptoms resulting from disease or injury. Coming into being, as it did, less than fifty-seven years ago, regional analgesia found a large number of enthusiastic surgical pioneers to explore its possibilities, exploit its application and evaluate it in surgical practice. Nerve block was discovered at the very dawn of modern abdominal surgery when the leaders in medicine were focusing the attention of the world on the blessings of the scalpel and were giving their best efforts toward developing the possibilities that anesthesia and antisepsis had given to surgery. Therapeutic nerve blocking had no such generous reception. It has not received even a small fraction of the experimental or clinical investigation accorded the application of physiologic nerve section for painless surgical manipulations. Only within the last few years has real enthusiasm been shown for blocking peripheral nervous pathways with analgesic solutions to control other than surgical pain or treat disease. Even now the development and inevitable improvements of this practice suffer from lack of interest, and its evaluation still awaits the final test of liberal clinical application.

HISTORICAL DEVELOPMENT

The extraordinary pace of modern scientific accomplishment and the rapid strides of contemporary medicine favor the discoveries and innovations that by their nature are immediately applicable to a developing field of practice or by their dramatic contribution establish an entirely new role in medicine. It may, however, be too fast a pace or too exacting for every new idea with merit to gain a firm foothold and soon find its proper place and be progressively improved. That seems to be the fate of therapeutic nerve blocking despite the fact that, long before regional anesthesia was a reality, drugs were being injected in the neighborhood of nerves to relieve pain and restore tissues to normal.

Regional anesthesia came into being and flourished into prominence in a remarkably short time. Its birth came with the momentous demonstration by Koller [1] (Sept. 15, 1884) of the anesthesia which followed instillations of cocaine solutions in the eye. His first formal paper, read before the Vienna Medical Society, was hardly published (in October 1884) before W. S. Halsted and R. J. Hall (in November 1884) originated and utilized the principle of nerve blockings by intraneural injection of cocaine solutions for surgical analgesia.[2] It then spread and grew to its present status. It is, of course, true of regional analgesia as with any scientific innovation that a varying period of preparation with accumulation of numerous seemingly unrelated facts and experiences precedes its demonstration. Discoveries in medicine are rarely, if ever, made by accident or are a spontaneous creation of their announcer: it is only when knowledge has advanced to a point at which some one with vision and inspiration may collect the facts, recognize their significance and proceed to create an epochal discovery. Before Koller, who found the drug, and Halsted and Hall, who first applied the method, are a long list of efforts to utilize chemical, physiologic and physical means to eliminate pain at its source in the peripheral nerves. Braun [3] in his early classic on the subject has a detailed account of many such investigations. Among them are the application of cold, compression of nerve areas, constrictions of the extremities and the local application of many drugs. The injection of drugs to relieve pain was a well developed practice, and local injections for anesthetic purposes were used many years before 1884. The hypodermic syringe, the tool destined to fill an all-important role in regional analgesia and therapeutic nerve block, was invented by Charles Gabriel Pravaz in 1851, and four years later Alexander Wood introduced the hypodermic syringe and needle for the relief of neuralgic pain with opium and morphine.[4] Hypodermic medication and intravenous injections, which followed immediately, were employed with enthusiasm for a quarter of a century before the discovery of the analgesic properties of cocaine. It is altogether likely that inhalation anesthesia, being developed during the latter part of the nineteenth century and being in the early stage of uncertainty in 1885, did not retard the experimental and clinical efforts to apply hypodermic injections for surgical anesthesia. It is quite evident that surgery was not ready to give an all out effort to any anesthetic method until near the end of the past century, when the antagonism to Lister's antisepsis was overcome and the fear of infections banished. Halsted [5] relates interestingly of his experiments in 1884-1885 with injecting the trunks of nerves supplying affected parts to permit surgery. Much of this work was done in a large tent erected near Bellevue Hospital in New York, since it was "impossible to carry out antiseptic precautions in the general amphitheater at Bellevue, where numerous anti-Lister surgeons dominated and predominated." Opposition to antisepsis was definitely overcome before the turn of the century. In practically all surgical centers dry heat and steam sterilization had replaced chemical antiseptics, and the stage was prepared properly thereby for the advent of cocaine as an anesthetic agent and the hypodermic syringe to bring its solutions in contact with unexposed nervous tissues. It is not unlikely that Halsted's wisdom and keen vision, which stimulated him immediately to apply Koller's discovery to general surgery and introduce the principles of regional anesthesia, would have had a greater influence in establishng the merits of nerve blocking had not his activities been interrupted by illness in 1885. It is now well known that he had become at this time an innocent victim to the drug cocaine,

From the Division of Surgery, Department of Anesthesia, New York University College of Medicine.

Read before the Section on Anesthesiology at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 6, 1941.

1. Koller, Carl: Historical Notes on the Beginning of Local Anesthesia, J. A. M. A. **90**: 1742 (May 26) 1928.

2. MacCallum, W. G.: William Stewart Halsted, Surgeon, Baltimore, Johns Hopkins University Press, 1930.

3. Braun, Heinrich: Local Anesthesia, ed. 3, translated by P. Shields, New York, Lea & Febiger, 1914.

4. Matas, Rudolph: Local and Regional Anesthesia, Philadelphia M. J. **6**: 820-843 (Nov.) 1900.

5. Halsted, W. S.: Surgical Papers, edited by Burkett, Baltimore, Johns Hopkins University Press, 1925.

which he so vigorously investigated.[4] Two years from his life was required to conquer the addiction and regain the energy that carried him to his great and commanding achievements in surgery and medical education.

EPIDURAL AND SUBDURAL ANESTHESIA

The story of the early days of regional anesthesia must include the monumental contribution of J. Leonard Corning of New York. At the time Halsted was establishing the principles of nerve blocking, Corning,[6] working on the problem from the neurologist's point of view, announced three notable discoveries. In November 1885 he described the first intrathecal injection of an anesthetic drug, the use of solutions placed epidurally and the important fact that the action of cocaine could be greatly prolonged by arresting the circulation in the anesthetized area with elastic constriction. The first of these contributions was lost for fifteen years and then resurrected and popularized by Bier (1899). The delay may be accounted for in part by the fact that it was six years after Corning's first "spinal" anesthesia that Quincke demonstrated the utility of lumbar puncture and showed that the introduction of a needle through the dura was feasible. The elastic tourniquet of Corning was replaced (1901) by Braun's discovery of the efficacy of "the chemical tourniquet," epinephrine.[3] A little earlier in France, Cathelin introduced epidural injections of cocaine by way of the caudal canal; but the method and the later use of the lumbar and thoracic routes gained wide acceptance only after the careful work of Lawen of Leipzig (1910), which showed that injections into the sacral canal did not reach the subarachnoid space.[4] Schleich (1888) gave great impetus to local and regional anesthesia by describing the value of isotonic saline solutions as the medium for preparing weak and less toxic dilutions of cocaine. With the solutions that he recommended, large amounts could be used to infiltrate wide areas of tissue and extend sensory anesthesia to include extensive operative fields. Except for the use of oil as an anesthetic agent diluent, little more was added to improve or replace the solutions used for injections until Schloesser (1903) suggested neurolytic injections of alcohol and Braun (1926) pioneered with its use for the control of the pain of angina pectoris.[7]

LABORATORY INVESTIGATIONS

The innovations to improve regional anesthesia and widen its scope in the early years were not confined to technical improvements, refinements of methods or the invention of more satisfactory tools. The contributions of scientific laboratories were not less important than those from clinics. The chemist Giesel isolated tropacocaine (1891), and Vinci with Merling (1898) produced the synthetic eucaine B as less toxic substitutes for the alkaloid cocaine. Stovaine (amylocaine hydrochloride) was introduced by Fournier (1903), and in the following year Einhorn discovered procaine (novocaine), the drug destined to reach and maintain, to the present day, the position of superiority as a regional analgesic agent.

The noteworthy list of contributions to this new medium for the control of pain must include many fundamental physiologic researches. Although the clinicians Koller, Halsted and Hall and other pioneers were without the benefit of previous animal experimentation, later investigators were aided by such contributions as those of François Frank, who found (1892) that the action of cocaine was not limited to sensory fibers and that its effect was transitory without permanent nerve injury. He coined the term "nerve blocking" and also referred to the procedure as physiologic nerve section. Sicard (1899) and Masso (1890) added definite knowledge on the toxic properties of cocaine and warned that its use in the subarachnoid space was limited to injections in the lower thoracic or lumbar regions.[4]

This recital of historical incidents in the story of regional anesthesia has included but a few of the more important and earliest "firsts" in its development, and the limitations of this manuscript prohibit more. During the present century so numerous have been the important contributions from laboratories, clinics and individuals that merely to list them would require reams of paper. However, no discussion of the development of therapeutic nerve block would be complete without reference to the epochal studies on the autonomic nervous system from the laboratories of Claude Bernard, François Frank, Walter Cannon, Head, Forester, Langley, Dale, Loewi and Heymans, to mention but a few whose contributions are familiar and require no further comment. Add to these the investigations from surgical clinics as those of Jaboulay, Cushing, Jonnesco, Leriche, Matas, Kappis, Adson, Royle, Dogliotti, Labat and J. C. White similarly important, and the building blocks of the present day clinical application of physiologic nerve section to therapy is portrayed and the form of the edifice being erected may be dimly visualized.

APPLICATION OF THERAPEUTIC NERVE BLOCK

Although therapeutic nerve blocking is an outgrowth of regional analgesia, utilizing the same anatomic and physiologic principles, and therefore has an identical historical development, it can be said to have come into actual existence and gained recognition as a therapeutic measure during the last score of years. This belated arrival of a procedure with so much promise is not readily understandable. Its use in the important conquest of pain is entirely logical, since its primary role, the control of pain from chronically diseased and injured tissues, has a much broader field than surgical analgesia. Moreover, the chapter written by the medical profession on the elimination of intractable and nonsurgical pain lacks brilliance. Therapy that includes narcotics with depression of bodily function and eventual addiction or the radical, often mutilating, surgical interventions as satisfactory remedies leave much to be desired. Any substitute that may promise to exempt bodily pain for even a relatively small number of sufferers has merit. Particularly is this true of therapeutic nerve block, since in competent hands it does not add to the patient's discomfort except temporarily in some cases during the manipulation and, if properly used, it is not often followed by untoward reactions. It has the further advantage of noninterference with other forms of treatment and requires minimal hospitalization. Moreover, therapeutic nerve block has recently gained a commanding argument for more general recognition, since it has been proved of value not for pain relief alone but to arrest the whole process of certain disturbed physiologic mechanisms and bring about a return to normal. The foregoing statements should not be construed as a recommendation for the indiscriminate or widespread use of therapeutic nerve blocking. It is a plea for a more generous appreciation

6. Corning, J. Leonard: Local Anesthesia, New York, D. Appleton & Co., 1886.

7. Schloesser, O.: Heilung peripherer Reissustände sensibler und motorischer Nerven, Klin. monatsbl. f. Augenh. **41**: 244, 1903.

of its advantages, more energetic efforts to explore its possibilities, to master and develop its technics and assign it to its proper place in therapy.

The number of nerve blocks that have been reported, often enthusiastically, in medical literature comprise an imposing list. It would be presumptuous to say that all these should assume a definite place in therapy. Neither have the experiences with the great majority recommended been extensive nor have they stood the test of uniformly successful results. However, many therapeutic nerve blocking procedures have been employed widely, and there have accumulated sufficient data to justify one to insist that they merit further trial and more widespread application. Some of those that have been employed in our clinic with optimistic results are included in this presentation without a detailed anatomic or technical discussion, or an attempt at accurate statistical evaluation.

SOLUTIONS FOR NERVE BLOCKING

It should be stated that the choice of the solution for injection constitutes, next to accurate diagnosis, the most important consideration in therapeutic nerve blocking. Procaine or similar analgesic drugs in saline solutions may be injected in the proper amounts and concentrations and repeated at frequent intervals without serious or disturbing sequelae. Drugs such as procaine in various oils may be used freely but with more caution since the complication of sloughing tissues, although uncommon, always is to be feared. Neurolytic injections of alcohol have been extolled often and not rarely condemned. Their use is justified when other less formidable therapeutic remedies have failed and injections of analgesic solutions are without permanent relief. An irritative neuritis will follow a small percentage of such injections. Disturbances of motor function and paralysis of sphincters may follow their (usually injudicious) use. It is to be remembered also that alcohol, if effective, must be placed in contact with nerve tissue and this requires an exacting technic. Finally, permanent cure is not always obtained, since regeneration of the injected nerve is inevitable. Reinjections may be performed, and, since the primary injection efficiently carried out usually eliminates pain for months or years and often permanently, the seriousness of the objection to alcohol is decreased. It may be argued confidentially that, compared with drug addiction so often following medical treatment and the many serious complications that accompany the imposing surgery frequently employed to eliminate pain, neurolytic injections of alcohol deserve less condemnation.

NERVE BLOCK OF HEAD AND NECK

Among the many therapeutic nerve blocks that have had wide application are those used to eliminate pains of the face and neck. Alcohol injections for the relief of trigeminal neuralgia has been the subject of many favorable reports which give results for thousands of treatments. If the diagnosis is without error and the solutions are properly placed, pain is always relieved. There are no contraindications to such treatment, and the only objection is that permanent relief is not always obtained. After several months or maybe years, pain usually returns. It is rarely, if ever, necessary to inject the gasserian ganglion, since excellent results are to be had by treating the separate peripheral nerve trunks.

Neuralgia of the greater occipital nerve has a pain distribution localized to the distribution of the posterior primary division of the second cervical nerve. Relief is readily obtained by perineural injections of this nerve with procaine-alcohol, as it winds around the lateral mass of the second cervical vertebra.

Intractable pain from tuberculosis or other diseases of the larynx may be relieved by injections of the superior laryngeal branch of the vagus. Failures to effect relief must be explained by a faulty technic which does not place the solutions in the exact plane of tissues to reach the nerve.

Cervical plexus neuralgia is usually limited to a single segmental nerve. With accurate localization and careful differential diagnosis, therapeutic nerve block may be done with favorable prognosis. Brachial plexus neuralgia, often confused with cervical plexus neuralgia, may result from spasm of the scalenus anticus, osteoarthritis of the cervical or upper thoracic vertebra and numerous other conditions. These disturbances are not favorable for nerve blocking therapy unless it can be shown that an individual nerve segment is involved and surgical therapy is not advised. Painful shoulder is a common complaint and most often is due to periarthritic involvement or subdeltoid bursitis. Relief of pain may be obtained frequently by perineural injections of procaine or oil-anesthetic solutions in the lesser scapular notch to interrupt sensory impulses passing through the suprascapular nerve.[8] Such treatment is definitely more valuable in acute conditions.

PARAVERTEBRAL SEGMENTAL NERVE BLOCKS

Blocking the thoracic and lumbar segmental nerves by the paravertebral route has several therapeutic indications. Intercostal neuralgia can be relieved by injecting the thoracic nerves. The same procedure is of definite value in the treatment of fractured ribs.[9] This procedure is recommended as prophylaxis against respiratory complications as well as for relief of pain. Postoperative pain following operations on the chest wall and upper part of the abdomen may become less severe or are eliminated with paravertebral injections.

The lumbar and sacral segmental nerves may be judiciously blocked for many painful conditions. Meralgia paresthetica may be relieved by injecting the second and third lumbar nerves. Neurodocitis involving individual nerve segments is satisfactorily treated with injections close to the exit of the nerve at the intervertebral foramen.

Sciatica has been a target for therapeutic nerve block with varying success, and many technics are advocated. The procedure found most successful here combines procaine injections into the body of the piriformis muscle with paravertebral injections. Adequate relief is usually obtained after the injections have been repeated one or two times.

The sacral nerves are blocked for different painful conditions. Coccygodynia is an example for which the third, fourth and fifth sacral nerves that unite to form the coccygeal nerve are blocked.

INTRACTABLE PAIN FROM CARCINOMA

No group of patients with pain as a predominant symptom are more difficult to treat than those with carcinoma. In the large majority this pain is difficult to localize and relieve with nerve blocking. However, the results are gratifying to many patients. If the nerve supply to the growth is determined and is accessible, as

8. Wertheim, H. M., and Rovenstine, E. A.: Suprascapular Nerve Block, Anesthesiology **2**: 541-545 (Sept.) 1941.

9. Rovenstine, E. A., and Byrd, Mary Lou: The Use of Regional Nerve Block During Treatment for Fractured Ribs, Am. J. Surg. **46**: 303-308 (Nov.) 1939.

frequently obtains in malignant growths of the face and neck, nerve blocks are definitely indicated. The upper thoracic nerves can be blocked to relieve pain from carcinoma of the lung and pleura. When the new growth involves the abdominal viscera the pain pathways may not be interrupted easily. Blocking segmental nerves alone is not often sufficient, and autonomic fibers must also be paralyzed. If some type of physiologic nerve section can be devised to obviate recourse to progressively increasing and ineffectual morphine medication or the serious chordotomy, it should be done. Certainly an effort to apply such procedures should precede the initiation of addiction or radical neurosurgery. Epidural injections, and in some extreme cases subdural injections, may be indicated.

PARAVERTEBRAL INJECTIONS OF SYMPATHETIC NERVES

The most interesting and probably more promising of fruitful results from therapeutic nerve blocking are the technics for interrupting sympathetic pathways with analgesic or neurolytic solutions. This recent practice has already gained wide application and produced many favorable reports. A comparison of the value of the chemical destruction of sympathetic pathways and surgical section cannot be made accurately with present knowledge and experience, but there are indications that for many conditions the former are to be preferred.

Interruption of the sympathetic pathways at the stellate ganglion is used to cure hyperhidrosis of the upper extremity. It is useful to relieve sympathalgia of the face and causalgia. It has been employed successfully to treat post-traumatic spreading neuralgias, the pain of amputation stumps and vasomotor disturbances. The treatment of angina pectoris after medical remedies have failed to relieve pain is now conceded to include alcohol injections of the upper thoracic sympathetic ganglions.[10] The same procedure has been effective in controlling or alleviating the distressing pain from an aneurysm of the arch or the descending aorta.

Interruption of lumbar sympathetic pathways is indicated for conditions in the lower extremities similar to those enumerated for the upper extremities. This therapeutic nerve block has been employed also to treat thrombophlebitis of the lower extremity. The results from these injections have been dramatic and largely successful. Not only is the pain relieved immediately but the whole process subsides promptly. This remedy represents so much of an improvement over previous therapeutic efforts that it should be used whenever the condition develops.

477 First Avenue.

ABSTRACT OF DISCUSSION

Dr. Charles F. McCuskey, Glendale, Calif.: The authors have adequately covered the subject of therapeutic nerve block from the standpoint of the early history and recent development. Their discussion of therapeutic application leaves no doubt that laboratory and clinical work must yet be done before we can properly select the cases that may be benefited by therapeutic procaine injections. Why some patients obtain permanent relief from pain after blocking of the nerves involved with a local anesthetic agent presents an intensely interesting problem. A procedure that I am using with sufficiently satisfactory results is blocking of the lumbar sympathetic for relief of thrombophlebitis. Two technics have been used for this procedure and the results have been equally satisfactory. Sixty-one patients have received this treatment. Of this number 27 were in the general hospital service and the injections were made by different persons. Out of this group, 14 had excellent results. When they were on their feet again there was no edema. Seven were classed as satisfactory; for example, a small amount of ankle swelling was noticed after they had been on their feet for some time. Six were unimproved. Of 34 patients treated, the injections being done mostly by one or two men, 27 had excellent results, 4 satisfactory and 3 were unimproved. A boy in his early teens with a comminuted fracture of the left forearm presented so much swelling and circulatory disturbance that it was feared amputation might be necessary. Block of the stellate ganglion produced significant improvement in the appearance of the hand. This block was repeated every other day until seven injections had been done. He was then able to get along without further treatment and now has a useful arm. This is one of the newer branches of anesthesiology and one which every regional anesthetist should study and cultivate. Three things are essentially important: 1. Careful evaluation of results following diagnostic procedures to rule out any psychic element that may influence the patient's opinion. 2. Accurate localization and diagnosis prior to injection. 3. Observation of all the principles and precautions of safe regional anesthetic procedures.

Dr. Brian C. Sword, New York: The history of regional anesthesia demonstrates the ingenuity and enthusiasm of American physicians for new things with merit. To the Europeans belongs the major credit in the early development of this valuable contribution to medicine. It is regrettable that up until recent years it has suffered from lack of interest here among neurosurgeons, internists and anesthetists. Lack of proper solutions is a definite handicap. Those of us who have become intrigued with the potential possibilities have many times realized the need of a solution that has greater action on sensory fibers and less on motor fibers. Anesthetists who in daily practice are doing caudal transsacral blocks for many surgical procedures gain valuable experience in the technical accomplishment of various alcohol blocks for intractable pains of malignant growths in the pelvis. Regional anesthesia and diagnostic and therapeutic field block go hand in hand and the more versatile a clinical anesthetist becomes in this field of endeavor, a greater contribution will he be able to offer his colleagues. The success or failure of therapeutic nerve block is based primarily on one of the fundamental principles governing all treatment in the practice of medicine; namely, a proper diagnosis. This of necessity means close cooperation between anesthetist and the doctor who refers the patient for a technical block of some type. The uncertainty of pain relief following the original block as well as the questionable duration of pain relief when accomplished has been a factor in deterring many anesthetists from attempting therapeutic and diagnostic field blocks. The short duration of pain relief does not necessarily imply that there has been an error in technic. The great advances accomplished in the use of therapeutic nerve block have been not only for the relief of pain but to treat disease as well. Therapeutic nerve block—the infant of the internist, the child of the surgeon and the playground of the anesthetist.

Dr. Paul W. Searles, Buffalo: I want to ask the authors if they have noticed any temperature changes of the fingers with the administration of the brachial plexus block in Raynaud's disease. I also wonder if they would cite their experiences in relation to the effects produced by subdural injections of alcohol into the spine of cancer patients and those with intractable pain.

Dr. Urban H. Eversole, Boston: I should like to ask Drs. Rovenstine and Wertheim and Dr. McCuskey how their results in the treatment of long-standing thrombophlebitis compare with those in the treatment of acute thrombophlebitis.

Dr. Emery A. Rovenstine, New York: Drs. McCuskey and Sword referred to the lack of interest among anesthetists in therapeutic nerve blocking. If regional anesthesia and diagnostic nerve blocking belong to the practice of anesthesia, we should correct the fault. If it is surgery or more particularly neurosurgery, then we may be excused for practically ignoring it. However, it does seem that, if anesthetists develop or perfect technics for interrupting nervous pathways to permit painless surgery, these methods might well be used by them to treat and diagnose disease and relieve pain other than that

10. White, James C.: Technic of Paravertebral Alcohol Injection, Surg., Gynec. & Obst. **71**: 334-343 (Sept.) 1940.

accompanying surgical manipulations. Criticism of available solutions is well taken. Alcohol is far from an ideal solution. We certainly need something to replace alcohol. We should make every effort to find it. The series of cases Dr. McCuskey mentioned in which lumbar sympathetic block was used to treat phlebitis is extremely interesting. This is one of the most dramatic and successful practices in the field of therapeutic nerve blocking. We have recently analyzed similar cases in Bellevue. Fifty-four patients have been treated. Seven were unsatisfactory and would not submit to a second injection; 4 were improved after only two blocks and 43 had satisfactory results. Most patients treated here have had early acute involvement. However, the block is certainly indicated in chronic cases. One case is that of a phlebitis for five months following hysterectomy which responded to one injection. I agree that interrupting the lumbar sympathetic pathway at any one point is sufficient. However, we still inject the first, second and third ganglions with procaine and lately we have been putting alcohol in the second. The matter of diagnosis has been stressed throughout the discussion and I think should be emphasized. The cases of Dr. McCuskey and the first case of Dr. Sword point definitely to the advantages in treating diseases other than those with associated pain particularly if vasospasm is present. We do not use brachial plexus block in the differential diagnosis of Raynaud's disease. It is simpler to do an ulnar block, and the results are satisfactory. I will not attempt to discuss the indications and limitations of subdural alcohol. When we employ such therapy, which is not often, the injection is made with the patient in the head down-feet down position, inclined forward, so that the apex of the angle formed is at the position of the principal nerve segment that we think may be involved.

PROTHROMBIN DEFICIENCY IN PULMONARY TUBERCULOSIS

CLINICAL RELATION AND SIGNIFICANCE IN HEMOPTYSIS

R. F. SHEELY, M.D.
WHITE HAVEN, PA.

Since 1937, when A. J. Quick demonstrated the relation of a low prothrombin level in the blood to a hemorrhagic tendency, there has been application of the Quick prothrombin test in the investigation of the bleeding tendency in many clinical entities. It has been established that a definite prothrombin deficiency is associated with the bleeding observed in obstructive and catarrhal jaundice.[1] A prothrombin deficiency has been observed in hemorrhagic disease of the newborn and in other clinical conditions, as has been well summarized by Snell and Butt.[2]

In a certain number of cases pulmonary tuberculosis is complicated with hemorrhage. This symptom of hemoptysis is most harassing and alarming to the patient. The incidence has been reported as ranging from 20 to 80 per cent. A. R. Masten[3] found that 33.8 per cent of 1,000 patients admitted to a sanatorium because of pulmonary tuberculosis had hemoptysis before discharge or death. To determine whether there occurred any disturbance in the mechanism of coagulation, an investigation of the prothrombin concentration was made on the blood of patients with active and chronic pulmonary tuberculosis at the White Haven Sanatorium.

From the White Haven Sanatorium.
Dr. Frank A. Craig and the medical staff of the White Haven Sanatorium cooperated in this study.

1. Quick, A. J.: Nature of Bleeding in Jaundice, J. A. M. A. **110:** 1658-1663 (May 14) 1938.
2. Snell, A. M., and Butt, H. R.: Supplementary Report on Vitamin K, J. A. M. A. **113:** 2056 (Dec. 2) 1939.
3. Masten, A. R.: Haemoptysis in Pulmonary Tuberculosis, Am. Rev. Tuberc. **25:** 42 (Jan.) 1932.

MATERIAL AND METHOD

In 106 cases of pulmonary tuberculosis the prothrombin concentration in the blood was studied. Quantitative estimations of the prothrombin in the plasma were made according to the method of Quick.[4] Oxalated plasma was recalcified in the presence of an excess of thromboplastin, and the clotting time was determined in seconds. The thromboplastin solution was made from a thymolized saline extract of freshly dried whole rabbit brain.

The obtained prothrombin times were then compared with the "normal control," which was obtained from 3 samples of normal plasma, and the determinations were repeated each time the thromboplastin solution was used. The percentage of normal was then computed by reference to the curve for each preparation of thromboplastin.

When the blood was taken, the temperature, pulse rate, respiratory rate, presence of cough and expectoration and weight curve were noted and roentgenologic estimate was made. Blood was taken as a routine for determination of the sedimentation rate and the cell volume. The routine laboratory tests and studies of the sputum were done for each patient.

The 106 patients with pulmonary tuberculosis were divided into those with minimal, with moderately advanced and with far advanced tuberculosis according to the roentgenologic standard as adopted by the National Tuberculosis Association and the American Sanatorium Association. Each group was divided by clinical status and roentgenologic study into subgroup A, patients who showed no evidence of healing or even of retrogression; subgroup B, those who showed evident improvement or a healing tendency, and subgroup C, those receiving some form of collapse therapy. The figures in table 1 are the results.

Roentgenologically, 11 patients, or 10.3 per cent, were classified as having minimal tuberculosis; 22, or 20.6 per cent, as having moderately advanced disease, and 73, or 69.1 per cent, as having far advanced tuberculosis.

In the group with minimal tuberculosis there was 1 patient, asymptomatic and afebrile, who had a recent area of infiltration in the upper lobe of the right lung. The remainder of this group was composed of patients who had shown evident improvement, clinically and roentgenologically, and had been taking regular exercise or working four to eight hours daily for two months to three years. One patient had been receiving treatments of artificial pneumothorax for three years and had been in active routine daily hospital work for the past two and one-half years.

Of the group with moderately advanced tuberculosis, 9 were members of the nursing staff who had been actively engaged in hospital work from three months to several years. Two had been treated regularly with artificial pneumothorax for more than three years and had been taking active exercise for one and one-half to two years. Three patients of this group had been admitted to the sanatorium shortly after they were found to be suffering from pulmonary tuberculosis.

Seventy-three patients had far advanced pulmonary tuberculosis. Forty-four were bedridden, were very toxic and either had been admitted recently to the sanatorium for therapy or during their course of

4. Quick, A. J.; Stanley-Brown, M., and Bancroft, F. W.: Study of Coagulation Defect in Hemophilia and in Jaundice, Am. J. M. Sc. **190:** 501 (Oct.) 1935.

sanatorium care had shown little tendency to improve clinically. There was a tendency to progression in some cases, even with a strict regimen of rest in bed. Fifteen patients, however, when studied, presented evident clinical and roentgenologic improvement in the tuberculous infection of the lung. These 15 were ambulatory and had no toxic manifestations. The fourteen remaining patients were treated surgically: One had thoracoplasty and 11 artificial pneumothorax, and 2 patients treated for one to two years with collapse therapy were in the course of having the collapsed lung reexpanded. Five of the 11 patients with pneumothorax had unsatisfactory collapse because of adhesions preventing the therapeutic measure from adequately controlling the disease. The remaining 6 with pneumothorax had a resulting collapse which was not totally satisfactory but controlled the disease so that the patients were symptomatically and clinically improved.

genologic improvement had a prothrombin concentration of more than 60 per cent of normal.

The concentration of prothrombin in the blood was determined in a series of nontuberculous, healthy persons. All of them had a concentration of more than 90 per cent of normal. In this study, a concentration of more than 90 per cent of normal is taken as the "normal range." Seventy-three per cent of the patients with minimal tuberculosis had prothrombin concentration within the normal range, and 100 per cent had a level over 70 per cent of normal. Sixty per cent of those with moderately advanced tuberculosis had a concentration within the normal range, and 86 per cent had a level over 70 per cent of normal. On the other hand, only 9.6 per cent of those with far advanced disease had a prothrombin concentration within the normal range, and 22 per cent had a concentration over 70 per cent of normal. The 16 patients with far advanced tuber-

TABLE 1.—*Prothrombin Concentration (Quick) in One Hundred and Six Cases of Pulmonary Tuberculosis* *

	Minimal Tuberculosis (11 Cases)				Moderately Advanced Tuberculosis (22 Cases)				Far Advanced Tuberculosis (73 Cases)			
Percentage of Normal	A†-1	B-9	C-1	Percentage	A-3	B-16	C-3	Percentage	A-44	B-15	C-14	Percentage
Over 100	1	5	..	54.6	..	5	..	22.7	..	..	..	0.0
100-90	..	1	1	18.2	1	7	..	36.4	..	4	3	9.6
89-80	..	2	..	18.2	1	..	1	9.1	..	3	1	5.5
79-70	..	1	..	9.0	..	2	2	18.2	..	4	1	6.8
69-60	..	..	..	0.0	..	2	..	9.1	2	3	2	9.6
59-50	..	..	..	0.0	1	..	..	4.5	8	1	3	16.4
49-40	..	..	..	0.0	..	..	..	0.0	22	..	3	34.2
39-30	..	..	..	0.0	..	..	..	0.0	11	..	1	16.4
29-20	..	..	..	0.0	..	..	..	0.0	1	..	..	1.4
19- 0	..	..	..	0.0	..	..	..	0.0	..	..	..	0.0
Mm. per Hour	Sedimentation Rate (Cutler)											
1-10	1	6	1	72.7	2	8	2	57.1	4	1	2	11.0
11-15	..	1	..	9.1	1	4	..	23.8	2	4	2	12.3
16-20	..	1	..	9.1	..	2	..	9.5	6	3	4	19.2
21-30	..	1	..	9.1	..	2	..	9.5	32	7	5	61.7
	Examinations of Sputum											
Positive	..	..	..	0.0	1	2	1	18.2	43	8	9	83.4
Negative	1	9	1	100.0	2	14	2	81.9	1	4	3	11.1
Occasionally positive	..	..	..	0.0	..	..	..	0.0	..	3	1	5.6

* Miss A. B. O'Neill assisted in part of the laboratory work.
† Subgroup A = no healing or retrogression; subgroup B = healing or improvement; subgroup C = collapse therapy.

ANALYSIS OF RESULTS

In 51 of the 106 patients studied, the prothrombin concentration was found to be less than 59 per cent of normal. Fifty of these had far advanced disease. One had moderately advanced tuberculosis. Forty-two of those with far advanced disease had active ulcerocaseous tuberculosis and were very toxic and ill. The sputum of every one contained the tubercle bacillus. The erythrocyte sedimentation rate of 94 per cent of the 42 was accelerated above the normal range. Indeed, 32, or 75 per cent, had a sedimentation rate as low as 21 to 30 mm. in one hour. Five of the 50 patients had been treated for two to seven months with artificial pneumothorax in one lung which was unsatisfactory and did not well control the disease and its accompanying toxemia. Two were undergoing reexpansion of the collapsed lung and had pleural effusions with systemic toxic symptoms, increased cough and expectoration and pain in the chest. One had chronic tuberculous osteomyelitis of the femur with far advanced chronic pulmonary tuberculosis.

Fourteen of the 15 patients who had far advanced tuberculosis and showed evident clinical and roentculosis whose prothrombin concentration was over 70 per cent of normal were divided between those with fibroulcerative tuberculosis who after long periods of rest in bed presented evident clinical improvement and those with ulcerocaseous tuberculosis who under collapse therapy that controlled the disease fairly well experienced clinical and subjective improvement.

COMMENT

The relation of toxemia, in the animal body, to a low prothrombin concentration in the blood was pointed out as early as 1937.[1] Judging from my study, there appears to be a relation between the prothrombin concentration in the blood and the degree of toxemia, as measured by clinical standards, in pulmonary tuberculosis. There seems to be a less certain relation between the prothrombin level and the extent of the active tuberculous involvement. In chronic, inactive tuberculosis, regardless of the original extent, the prothrombin concentration is usually within the normal range. From the material studied, it is suggested that as regression takes place in the tuberculous lesion, so that the patient taking graded degrees of exercise does

not show clinical signs of toxemia, the study of the prothrombin concentration usually shows an elevation, provided, of course, that there is no complicating condition. In most cases studied, the prothrombin level tended to parallel the clinical status of the patient. There was no constant parallel between this level and the erythrocyte sedimentation rate (uncorrected for anemia, if present) in my study. One patient with minimal tuberculosis, who showed no clinical evidence of toxemia while doing routine nursing duties, had a prothrombin level of 83 per cent of normal, whereas the sedimentation rate was reported as 27 mm. in one hour. One patient with far advanced tuberculosis, not included in this study, had a sedimentation rate of 4 mm. an hour, whereas the prothrombin level was reported as 55 per cent of normal; this patient exhibited toxemia on the least amount of exercise. It might be suggested that the evaluation of the true role of prothrombin concentration in the activity of pulmonary tuberculosis waits on determinations at regular intervals throughout the clinical course of the disease in an appropriate number of cases and comparison at or near those intervals with other clinical, laboratory and roentgenologic studies.

SIGNIFICANCE OF PROTHROMBIN CONCENTRATION IN SURGICAL PROCEDURES ON TUBERCULOUS PATIENTS

Seventeen patients with pulmonary tuberculosis who were treated with artificial pneumothorax were studied; 13 had far advanced tuberculosis. Five had had unsatisfactory collapse established, which did not adequately control the disease. Further surgical procedures might be indicated as the logical approach to these problems. The prothrombin concentration of the 5 ranged between 59 and 35 per cent of normal. The disturbance in the mechanism of coagulation which may result from a prothrombin level of this degree may add to the complications both operatively and postoperatively, as far as the welfare of the patient is concerned. Determination of the significance in surgical procedures of the prothrombin concentration is dependent on further study and observations.

SIGNIFICANCE OF PROTHROMBIN DEFICIENCY IN HEMOPTYSIS IN PULMONARY TUBERCULOSIS

In recent months I have been making detailed reports on every case of frank hemorrhage and blood-streaked sputum, however slight the streaking (table 2).

Over a period of six weeks, there were 13 patients (6.5 per cent) in the sanatorium who had frank hemorrhage or streaking of bright red blood in the sputum. Three had acute infections of the upper respiratory tract, and in the course of one to three days after onset had only the slightest streaking, which was of no consequence. Among the remaining 10, 3 had streaks of bright red blood in the sputum, the condition lasting for one to three days and not being associated with infection of the upper respiratory tract. Seven patients had frank hemoptysis, the discharge varying from 1 to 3 ounces (29 to 87 cc.) of bright red blood, with resulting streaking for one to twelve days. Eight (80 per cent) of the 10 patients had a prothrombin concentration of 49 per cent to 35 per cent. All had far advanced disease. Two who had frank hemorrhage had a prothrombin level between 79 and 70 per cent of normal. One of these had a cell volume of 38.5 per cent; the other had a normal cell volume. Both had far advanced disease which had undergone evident improvement over the course of many months of sanatorium care and had had a sudden setback of hemoptysis, followed by streaking in 1 case, with severe cough, for twelve days. The mechanical and physiologic factors, such as permeability, intrapulmonary blood pressure and congestion, must always be kept in mind.

The treatment of pulmonary hemorrhage has been unsatisfactory. Tissue extracts, such as thromboplastin, have not yielded effective results. In 1926, C. A. Mills [5] concluded from his studies of hemorrhage in typhoid fever and tuberculosis that there appeared to be a disturbance in the blood which interfered with the normal coagulation. He recommended blood transfusion as the surest measure to control hemorrhage in these diseases. A. R. Masten [3] substantiated this observation in tuberculosis. Quick [1] found that the prothrombin level of the blood was elevated after a transfusion of fresh blood in animals with hemorrhagic tendency associated with a low prothrombin concentration. J. Rhoads [6] reported that certain vitamin K substrates produced an increase in blood prothrombin in a majority of the cases of hypoprothrombinemia which he studied. In a small percentage of the cases studied by Rhoads, however, there was no improvement of the prothrombin level after vitamin K had been given.

TABLE 2.—*Prothrombin Concentration (Quick) in Thirteen Cases of Blood-Streaked Sputum or Frank Hemorrhage*

Percentage of Normal	Frank Hemorrhage	Streaking	Slight Streaking with Colds, U. R. I.
	7	3	3
Over 100	..	..	..
100-90	..	..	..
89-80	..	..	1
79-70	2	..	1
69-60	..	..	..
59-50	..	..	1
49-40	4	2	..
39-30	1	1	..
29-20	..	..	..
19- 0	..	..	..

The stage being set for pulmonary hemoptysis, for example by a softening of caseous areas of tuberculous infection, it would seem from the small number of cases that the prothrombin deficiency may be a significant factor to consider, with other established factors, in the problem of control of hemoptysis in pulmonary tuberculosis in certain cases.

In this regard, 4 of the patients listed in table 2 as having frank hemorrhage associated with low prothrombin levels of 49 to 35 per cent were treated with synthetic vitamin K.

CLINICAL COURSE IN FOUR CASES

CASE 1.—Mrs. E. S., aged 56, had far advanced ulcerocaseous pulmonary tuberculosis. She was toxic and febrile, and had a severe cough with a moderate amount of expectoration. The cell volume was 44 per cent and the blood pressure 148 systolic and 92 diastolic. On Nov. 24, 1940 there was a sudden hemorrhage of 3 ounces (87 cc.) of bright red blood after a severe attack of coughing. Ten cc. of thromboplastin was

5. Mills, C. A.: Hemorrhages: Their Significance and Methods of Treatment, Am. J. M. Sc. **172**: 71 (July) 1926.

6. Rhoads, J. E.: Symposium on Fluid and Electrolyte Needs of the Surgical Patient: Physiologic Factors Regulating the Level of the Plasma Prothrombin, Ann. Surg. **112**: 568 (Oct.) 1940.

given intravenously and the administration of calcium and vitamin C by mouth was started. On November 26 the patient was still coughing up mouthfuls of bright red blood at irregular intervals. Twenty cc. of thromboplastin was given intravenously. The next morning the patient was still coughing up bright red blood and was not improved. In the afternoon, the prothrombin level was determined at 47 per cent of normal. Two mg. of menadione ("proklot," Lilly) was given by mouth with 3 grains (0.19 Gm.) of bile salts. One mg. of menadione with 3 grains of bile salts was given every six hours for ten doses.

On November 28 dark streaked sputum was noticed in the morning, but the amount of blood was definitely less. On November 29 there were some dark red streaks of blood in the sputum. On November 30 there were only occasional streaks in the sputum, and by December 1 the sputum was clear. On December 4 the prothrombin level was 130 per cent of normal.

CASE 2.—M. S., a woman aged 22, had far advanced pulmonary tuberculosis. The temperature was 99.3 F., the pulse rate 108, the respiratory rate 26 and the blood pressure 120 systolic and 70 diastolic. The cell volume was 34 per cent. She was completely bedridden.

On December 17, 1940 there was hemoptysis, with a discharge of 3 ounces (87 cc.) of bright red blood. The prothrombin level was 45 per cent of normal. One mg. of menadione was given with 3 grains (0.19 Gm.) of bile salts every six hours for ten doses. On December 18, eighteen hours later, there were only occasional dark red streaks in the sputum. The following day the sputum was clear, and there has been no bleeding since. On December 21 the prothrombin level was 83 per cent of normal.

CASE 3.—N. R., a girl aged 16, had far advanced ulcerocaseous tuberculosis in both lungs. She was bedridden. The temperature was 97.3 F., the pulse rate 84 and the respiratory rate 20. The patient had been losing weight and had severe cough. The cell volume was 34 per cent. The sputum had been streaked with bright red blood for four weeks since admission. On December 9, 1940 the level of prothrombin was 37 per cent of normal. The patient was given 1 mg. of menadione with 3 grains of bile salts every six hours for ten doses. She later was reported "to have vomited after taking pills." On December 11 the prothrombin level was 33 per cent of normal. There was no effect on blood streaking. On December 20 the patient was given 1 mg. of 4-amino, 2 methyl 1 naphthol as hydrochloric acid ("synkamin," Parke, Davis & Co.) intramuscularly every six hours for four doses. The next day she did not have streaks of blood in the sputum. The prothrombin level was 60 per cent of normal. On Jan. 1, 1941 the patient again started to have sputum streaked with bright red blood. The prothrombin level was 47 per cent of normal.

CASE 4.—A. C., a youth aged 21, an Italian, had far advanced fibroulcerocaseous tuberculosis in both lungs. The temperature was 98.3 F., the pulse rate 70 and the respiratory rate 26. The weight was stationary. There was little cough and expectoration. The patient remained in bed. On Dec. 31, 1940 there was hemoptysis, with a discharge of 3 ounces of bright red blood, followed by heavy streaking of the sputum. The prothrombin level was 47 per cent of normal. The patient was given 1 mg. of menadione with 3 grains of bile salts every six hours for ten doses. On Jan. 1, 1941 the sputum was streaked with dark blood. The following day the sputum was clear, and it remained so. On January 3 the prothrombin level was 140 per cent of normal.

It is suggested from the material at hand that the prothrombin deficiency associated with pulmonary tuberculosis can be relieved, in some cases, by the administration of vitamin K. The clinical observation that the elevation of the prothrombin concentration of blood is accompanied by an increased tendency to clotting of the blood would indicate the possibility that synthetic vitamin K may be an addition to the armamentarium in the control of hemoptysis in certain cases of pulmonary tuberculosis. The parenteral route of administration (intravenous or intramuscular) is apparently the best for patients who are very toxic and who have gastrointestinal disturbances which may affect absorption.

During the administration of the synthetic vitamin K substances there were no untoward effects. One patient complained of itching of the skin over the face, arms and chest for one day during the treatment. One patient was reported to have vomited within one hour after receiving the medication by mouth. The same person had no vomiting associated with receiving the vitamin K intramuscularly (which was an aqueous solution).

Case 3 illustrates that although the prothrombin level may be elevated, the attained level does not persist. A gradual depression of the prothrombin concentration is observed when tuberculous patients are studied at intervals.[7] The rapidity with which this depression occurs seems to be related, in some way, to the degree of toxemia present.

SUMMARY AND CONCLUSIONS

Among 106 cases of active and chronic pulmonary tuberculosis (10.3 per cent of minimal, 20.6 per cent of moderately advanced and 69.1 per cent of far advanced tuberculosis) studied in regard to the concentration of prothrombin in the blood, a significant deficiency of prothrombin was found in 51.

Fifty of the patients had far advanced tuberculosis, and 5 of these were receiving treatment with artificial pneumothorax with resulting unsatisfactory collapse of the diseased lung. Two patients were undergoing reexpansion of the collapsed lung.

Among the patients, seventy-three per cent with minimal, 60 per cent with moderately advanced and 9.6 per cent with far advanced tuberculosis had a prothrombin concentration within the normal range. Sixty-eight and one-half per cent of those with far advanced tuberculosis had a prothrombin concentration below 59 per cent of normal.

There was no constant relation between the prothrombin concentration and the sedimentation rate. The status as to prothrombin level appeared to coincide with the clinical and roentgenologic status of the majority of the patients.

It is suggested that the prothrombin concentration should be determined in every case of hemoptysis in pulmonary tuberculosis. In 4 cases of frank hemoptysis with associated prothrombin deficiency, the elevation of the blood prothrombin level on the administration of vitamin K, orally and parenterally, was a likely factor in the control of the hemoptysis.

The significance of the prothrombin concentration in surgical procedures on patients with pulmonary tuberculosis must await further study.

The prothrombin concentration in the blood of patients with tuberculosis seems to be related, in some way, to the toxemia resulting from the existing tuberculous infection in the lung.

7. Unpublished data.

CONCENTRATION METHOD OF RADIOTHERAPY

FOR CANCER OF THE MOUTH, PHARYNX AND LARYNX

MAX CUTLER, M.D.
CHICAGO

My purpose in this paper is to present the results of recent efforts to influence the more radioresistant forms of cancer of the mouth, pharynx and larynx by means of new methods of roentgen ray and radium treatment. The study is based on the observation of some 850 cases of cancer of the mouth, pharynx and larynx treated in the Chicago Tumor Institute and the Hines Veterans Hospital.

The divided dose technic, generally known as the "Coutard method," or some modification of it is the most prevalent form of roentgen ray treatment now in use. So much confusion surrounds the use of the term "Coutard method" that an effort to clarify this term may be useful. First it should be pointed out that Coutard [1] has never adhered to a rigid technic or to a single principle of treatment. The technic to which the term "Coutard method" is generally applied is based on the use of moderate daily doses of roentgen rays until a pronounced reaction in the mucous membrane and skin is produced. Decided variations in daily and total doses and in the intensity of the reactions are included in technics described as the "Coutard method." After using a treatment time of thirteen to sixteen days for several years, Coutard prolonged the time first to eighteen days, then to twenty days and finally to twenty-five days, using daily doses of 400 and 300 roentgens. Several years later he prolonged the time still further to thirty, forty and fifty days with a corresponding reduction in the daily dose to 250, 200 and 150 roentgens. In addition to varying the total treatment time and the daily dose, Coutard has explored various other methods including preparatory treatment, supplementary treatment, periodicity and the treatment of the tumor bed with protection of the tumor. It is obvious, therefore, that the use of the term "Coutard method" without specifications is indefinite and misleading.

These studies were made in collaboration with the staff of the Chicago Tumor Institute and the Cancer Unit of Hines Veterans Hospital. I am especially indebted to Coutard for stimulating many new ideas in roentgen therapy in the Chicago Tumor Institute (1938-1941).

RADIOSENSITIVITY

The radiosensitivity of a tumor is related to the site of origin, stage of disease, papillary or infiltrating character and histologic structure.

The site of origin of a carcinoma frequently determines its radiosensitivity; thus, a carcinoma arising in the false cords or epiglottis is generally radiosensitive not only in its early stages but even when advanced, whereas a carcinoma of the true cord is radiosensitive only in its early stages. Once the lesion has infiltrated and immobilized the underlying muscles it is radioresistant.

The old classification of cancer into two main forms, papillary and infiltrating, has an important significance in relation to radiosensitivity, for the general rule holds that the papillary forms are sensitive and the infiltrating forms resistant. It should be noted, however, that there are exceptions.

The microscopic structure is of help in estimating radiosensitivity and guiding treatment. Information from this source is of greatest value when interpreted in the light of the clinical and gross anatomic factors.

No sharp line of demarcation can be drawn between radiosensitive and radioresistant lesions. The quality of radiosensitivity varies in degree, and there is no accurate method of expressing different degrees of radiosensitivity. This fact makes it exceedingly difficult to evaluate new methods of treatment, and the critical observer who effects a startling result by a new method of irradiation is haunted with the possibility that the result may have been due to a high degree of radiosensitivity rather than to the special method employed. In order to avoid this pitfall it is important to select lesions in which a high radiosensitivity can be excluded with reasonable certainty. Examples of such lesions are (1) extensive infiltrating carcinoma of the anterior two thirds of the tongue, which is highly differentiated (adult hornifying squamous carcinoma) and (2) carcinoma originating in the true cord and infiltrating and immobilizing the underlying muscle. Lesions of this type have been selected in testing the effectiveness of new radiotherapeutic methods now reported.

CLINICAL-PATHOLOGIC CLASSIFICATION IN RELATION TO RADIOSENSITIVITY

Cancers of the mouth, pharynx and larynx fall into two broad general groups from the point of view of radiosensitivity and radiocurability:

1. *Radiosensitive Group.*—Lesions originating in the mucous membrane overlying loose connective tissue which lack the power to infiltrate the underlying muscle and which grow for long periods as movable noninfiltrating lesions. Carcinomas of this type sometimes reach large proportions and form bulky masses. They generally arise in cylindric cells and are undifferentiated. The regional lymph nodes which become the seat of metastases are comparatively soft and remain circumscribed and movable even when they have become quite large. In this respect they resemble the primary lesion. Lesions of this type are highly malignant and as a rule highly radiosensitive in spite of their extent or the presence of regional metastasis. Classic examples are cancers originating in the tonsil, epiglottis, false cords, pyriform fossa and aryepiglottic fold.

2. *Radioresistant Group.*—Lesions arising in the mucous membrane overlying dense connective tissue and having a tendency to early infiltration of the underlying muscle with early fixation of the surrounding structures. Metastasis generally occurs later than in the former group and involves the regional lymph nodes in close proximity to the lesion. The lymph nodes are firm and tend to early fixation in contradistinction to the other group, in which the lymph nodes are softer and tend to remain circumscribed and movable over long periods. Histologically these lesions exhibit adult, differentiated morphologic features. In their early stages, when the growth is still superficial, they are radiosensitive and often radiocurable in spite of their structure. Once the underlying muscle has become invaded and fixed, the lesion becomes more radioresis-

Aided by a grant from the National Cancer Institute.

1. Coutard, Henri: Roentgen Therapy of Epitheliomas of Tonsillar Region, Hypopharynx and Larynx from 1920 to 1926, Am. J. Roentgenol. **28**: 313 (Sept.) 1932; Present Conception of the Treatment of Cancer of the Larynx, Radiology **34**: 136 (Feb.) 1940.

tant. An example of this type is infiltrating, adult, hornifying, squamous carcinoma of the anterior two thirds of the tongue.

EFFORTS TO STERILIZE THE RADIO-RESISTANT LESIONS

The present method of using divided daily doses of roentgen rays for twenty to fifty days with a total dose adequate to produce characteristic cutaneous and epithelial reactions has resulted in the cure of approximately 25 per cent of carcinomas of the mouth, pharynx and larynx. This includes all stages of the disease and all histologic forms. The 75 per cent failures must be attributed to the radioresistance of the lesions and the extent of the disease. By separating cancer of the mouth, pharynx and larynx into two broad groups on a clinical-pathologic basis, it becomes perfectly clear that, with rare exceptions, the 25 per cent of cures by external irradiation have occurred in the first or radiosensitive group and the 75 per cent of failures in the second or radioresistant group. Not until knowledge of radiosensitivity reached a stage in which a clinical-pathologic classification became feasible was it possible to make this interpretation.

Since 1938 efforts have been under way in the Chicago Tumor Institute and the Hines Hospital to extend the effectiveness of external irradiation to the more radioresistant lesions which hitherto failed to respond to the former methods of roentgen and radium therapy; i. e., to group 2. The following topics have been the subject of investigation:

The use of higher voltage (400 kilovolts) and telecurietherapy (10 Gm. radium bomb); shortening of the time interval with a corresponding increase in the daily dose; the use of increasing daily doses through diminishing ports; the use of an interrupted treatment administered in two cycles; preparatory treatment; supplementary treatment; treatment of the tumor bed with protection of the tumor; treatment through lead perforations.

Up to this time I [2] have not seen any beneficial results from the treatment of the tumor bed with protection of the tumor. The same holds true for the supplementary treatment. Certain benefits have been observed from the use of preparatory treatment in extensive and infected lesions. There appear to be advantages in the use of lead perforations in the treatment of certain lesions, and a separate paper on this subject is in preparation.

One principle of roentgen and radium therapy has arrested attention: I have called it the method of concentration. The treatment may be administered continuously or in two cycles interrupted by a rest period of eleven to fifteen days.

THE METHOD OF CONCENTRATION

The basis of this technic is the use of large daily doses over a short treatment period (nine to twelve days) and a total dose sufficient to produce an "epithélite" and "epidermite." In selected cases the daily dose is increased as the size of the port is diminished.

Voltage.—Experience with the use of voltages higher than 200 kilovolts (400,000 to 1,000,000) is gradually accumulating, and certain advantages of higher voltage have been observed and recorded; but, so far as I know, there is no published report of a comparison between the use of 200 kilovolt roentgen rays and higher voltages based on comparative clinical studies in which voltage has been the only variable factor. Not until such studies are available will it be possible to draw definite conclusions. While the results of such studies are being awaited, certain observations are pertinent.

Clinical experience supports physical observation that the cutaneous reactions for equal doses diminish progressively as the wavelength becomes shorter. This observation is based on the use of 200 kilovolt roentgen rays, 400 kilovolt roentgen rays and telecurietherapy and confirmed for million volt roentgen rays by Failla and Quimby,[3] and by Parker.[4] Other advantages of higher voltages are an increased depth dose and a more restricted beam of radiation. The latter may account for the result that radiation sickness is less pronounced and less common with the use of higher voltages and telecurietherapy. In certain lesions higher voltages and telecurietherapy permit the use of a single field, with a corresponding improvement in the precision of treatment. The comparative value of roentgen therapy and telecurietherapy also awaits adequate clinical studies with control of all possible factors except the quality of the ray. Such studies are now in progress.

Intensity (number of roentgens per minute).—In the development of the new technic, intensities varying from 3 roentgens per minute to 10 roentgens per minute have been used. Edema and serious injury to the connective tissue and blood vessels can be avoided by the use of low intensities. It is suspected that it would be dangerous to apply the new technic with higher intensities and I warn against it. The proposed technic involves irradiation with large doses which may produce effects on the normal tissues just short of permanent damage.

The Fields.—In the treatment of cancer of the mouth, from one to three fields are used, depending on the site and extent of the lesion. In the treatment of cancer of the pharynx and larynx, two lateral fields are generally used.

As a rule the peripheral portions of a cancer are more radiosensitive than its central portion at or near the point of origin. Many carcinomas regress under external irradiation and leave a central unsterilized radioresistant remnant which under some circumstances is best treated with a sharp, intensive radiation by the interstitial method. Based on the knowledge that the central portion of a carcinoma is more radioresistant and therefore requires more intensive irradiation, a technic has been developed in which the size of the field is gradually reduced and the daily dose gradually increased. If the supposition is correct that the periphery of a tumor is more radiosensitive than its center, this technic permits a more efficient distribution of the irradiation. Radiation energy, which is so often wasted on the normal tissues in the periphery of a tumor, is conserved by means of this technic for the treatment of the central, radioresistant portion, which is generally the site of recurrence. Thus my associates and I have administered safely 1,400 roentgens in two sessions in one day through a port measuring 3 by 3 cm. This technic is used in carefully selected cases in which the lesion is small, fixed and highly radioresistant. In the treatment of intrinsic cancer of the larynx we generally

2. Cutler, Max: Radiosensitive Intraoral Tumors: A Clinical Study, Arch. Surg. **18:** 2303 (June) 1929; The Problem of Radiosensitivity, J. A. M. A. **103:** 1204 (Oct. 20) 1934; Cancer of the Larynx: Relation Between Gross Anatomy, Microscopic Structure and Radiosensitivity, ibid. **115:** 1339 (Oct. 19) 1940.

3. Failla, Gioacchino, and Quimby, Edith H.: Decrease of Skin Damage by Deflecting Secondary Electrons from a Beam of One Million Volt X-Ray, read before the American Physical Society, Washington, D. C., in April 1940.

4. Parker, H. M.: The Dependence of the Back-Scattering of Roentgen Rays in a Phantom on Focal Distance, Quality of Radiation and Field Size, Acta radiol. **16:** 705 (No. 6) 1935.

begin with a field of 48 sq. cm. This is reduced gradually to a final field of 12 sq. cm. and sometimes 6 sq. cm., depending on the original size, location and nature of the lesion. Great care and precision are necessary with the use of smaller fields. In the Chicago Tumor Institute all x-ray machines are provided with a light centering device and a diaphragm which permit localization and flexibility. Great care must be taken in the immobilization of the patient, and the field must be checked during the treatment.

Time.—For many years efforts have been made to determine the optimal time over which a given malignant tumor should be irradiated. Regaud's [5] original experiments with the ram led him to suggest a total period of twenty to twenty-five days, but his later experiments suggested a treatment time of ten days. One highly important fact emerges from our experience in radiotherapy, namely that the more radioresistant the lesion the shorter must be the treatment time and the larger the daily dose. A superficial papillary carcinoma of the true cord, for example, can be sterilized with 6,000 roentgens given in small daily doses over a period of forty to fifty days. A carcinoma of the true cord which has infiltrated the underlying muscle and caused a partial or complete fixation of this structure cannot be sterilized by this method but in a certain proportion of cases can be sterilized when 6,000 roentgens are given over a period of twelve days or less. It is clear that the more radioresistant lesions require not only an adequate total dose but an adequate daily dose. In other words, an adequate total dose distributed over a period of such length that the daily dose falls below a certain level fails to sterilize the more radioresistant carcinomas. Different total treatment periods varying between four days and eighteen days are being tested. The treatments are given twice daily and continuously. The optimal period has not yet been determined.

Daily and Total Doses.—One of the questions that arises with regard to dosage is whether the more radiosensitive forms of cancer should be treated with smaller total doses than the more radioresistant types. This conception is a fallacy. It is hazardous to administer a less intensive treatment to a supposedly more radiosensitive lesion. There are, of course, exceptions to this rule. It seems safer to treat all lesions on the assumption that they belong to the more radioresistant variety. Thus we approach the radiation of a malignant lesion on the basis of the maximum treatment that can be safely tolerated by the patient and by the normal tissues surrounding the growth.

Telecurietherapy (10 Gm. radium bomb).—The apparatus contains 10 Gm. of radium and is used at 12.5 cm. distance. The ports vary from 10 cm. in diameter to 4 sq. cm. An effort is under way to determine the comparative value of telecurietherapy and roentgen therapy. All factors that can possibly be controlled are made comparable so that the principal variable factor is the quality of the ray. Lesions of the mouth, pharynx and larynx are selected for their similarity as to site of origin, extent of disease and structure. Such comparable cases are treated by the different methods in an effort to determine the comparative results. It can be said at this time that telecurietherapy is a most useful method of irradiation, and some highly interesting results have been obtained especially since the "method of concentration" and the "interrupted method" of irradiation have been employed.

5. Regaud, C., and Dubreuilh, G.: Perturbations dans le développement des oeufs fécondes par des spermatozoïdes roentgenisés chez le lapin, Compt. rend. Soc. de biol. **64:** 1014, 1908. Regaud, C., and Lacassagne, A.: Sur l'évolution générale des phénomènes déterminés dans l'ovaire de la lapine par les rayons X, ibid. **74:** 601, 1913. Regaud, C.: Le rythme alternant de la multiplication cellulaire et la radiosensibilité du testicule, ibid. **86:** 822, 1922.

INTERRUPTED TREATMENT

One group of cases has been treated in two cycles separated by an interval of eleven to fifteen days. Such treatments have been executed with roentgen rays and with telecurietherapy with some interesting results. We have found this technic especially useful in the treatment of carcinoma of the pharynx and larynx. The severe reactions which are sometimes observed by the continuous method can be avoided by treating in two cycles, and the evidence so far indicates fully as pronounced an effect on the lesion as when the treatment is continuous. In some instances we have the impression that the results are superior to those which might have been obtained with the continuous method under similar circumstances. It should be noted that the interrupted method utilizes the principle of concentration; i. e., the treatments are given in a short interval with high daily doses and in suitable cases with increasing doses through diminishing ports. The number of cases treated is not sufficient nor is the time interval adequate to permit definite conclusions, but experience so far encourages the continuation of this method and it is recommended as a highly useful technic, especially in cancer of the pharynx and larynx.

COMMENT

A new technic of external radiation has been presented which appears to be more effective in the radioresistant forms of cancer of the mouth, pharynx and larynx than the methods of external irradiation now in use. It is called the method of concentration.

Since this method has been used only three and one-half years, nothing can be said of the permanence of the results. It has been established, however, that certain carcinomas of the mouth, pharynx and larynx which failed to respond to all other methods of external irradiation have shown decided regression and in many instances have disappeared completely under the new method of external irradiation.

Treatment has been executed with telecurietherapy (10 Gm. radium bomb) and with roentgen rays (200 and 400 kilovolts).

The underlying basis of the "method of concentration" may be stated as follows:

1. The conception that the more radioresistant forms of cancer require a higher daily dose and a shorter total treatment period (twelve days or less).

2. The administration, in selected cases, of an increasing daily dose through a diminishing port in order that the central, more radioresistant portion of the lesion may receive a much larger dose than is possible when the size of the port remains constant.

3. The administration of an adequate dose sufficient to produce the classic epidermite and epithélite, such dose representing the maximum treatment that can be tolerated by the normal tissues of the tumor bed.

The interrupted method of irradiation using the principle of concentration has proved especially satisfactory. The definite impression has been gained that the periods of rest to the normal tissues and to the patient are highly advantageous and the effect on the tumor appears at least as pronounced as with the continuous method of treatment. Should further studies confirm the present impression that the sterilization of the lesion is as

certain by this method as by the continuous method, we shall substitute the "method of interruption" for the "continuous method" in suitable cases.

These technics are in no way intended to be final. They merely represent what seem to be advances in external irradiation and they are described in the hope that others will utilize them and publish their results.

SUMMARY

A new principle and technic of external irradiation gives a more pronounced effect on the more radioresistant forms of cancer of the mouth, pharynx and larynx than the methods of external radiation now in use. This technic has been called the method of concentration. It can be applied daily and continuously or in two cycles interrupted by a rest period of eleven to fifteen days.

21 West Elm Street.

THE IMPORTANCE OF AIR-BORNE PATHOGENIC BACTERIA IN THE OPERATING ROOM

A METHOD OF CONTROL BY STERILIZATION OF THE AIR WITH ULTRAVIOLET RADIATION

DERYL HART, M.D.

DURHAM, N. C.

During the first five and one-half years of the Duke Hospital, as a result of extensive studies carried out in an attempt to determine the cause of "unexplained infections" in clean wounds, we were forced to the conclusion that pathogenic bacteria floating in the air and sedimenting on the wound and sterile field were the cause of most of the unexplained infections in our operating rooms. We were unable to control this source of infection despite many changes in technic until ultraviolet radiation (predominantly 2,537 angstroms) was utilized to kill the bacteria (and fungi) in the air or after they sedimented on the sterile field.

During the past five and one-half years since this technic of air sterilization was adopted the infection rate in clean wounds has been reduced to a small fraction of the previous level, and where it was used we have had no death from an infection in a clean wound. We offer this experience in proof of our conclusions as to the source of these infections and as an example of what can be accomplished when this source of infection is brought under control.

During the years 1930-1936, and to a lesser extent since that time, our entire "aseptic technic" has been checked repeatedly by bacteriologic cultures. The following facts were determined:

1. The usually accepted "aseptic technic" was satisfactory as far as the sterilization of supplies, instruments and so on was concerned. Fresh laundry was usually free of pathogenic bacteria. The surface of the skin of the personnel and patient after preparation for operation was usually free of organisms and after a period of moderate perspiration it usually showed only staphylococci, usually albus, rarely aureus, and almost never the hemolytic Staphylococcus aureus, the cause of most of our severe infections.[1]

2. Over 90 per cent of our wounds infected from an unexplained source contained staphylococci, predominantly aureus, and usually hemolytic.[1]

3. Staphylococci could invariably be recovered from the air of the operating rooms during occupancy. At times hemolytic yellow staphylococci could be grown on sterile Petri dishes of blood agar exposed to the air near the operative incision during the operation and could be identified before the infection caused by a similar organism showed up in the wound. These organisms produced a powerful toxin and the patients so infected at times had a temporary urinary suppression followed by hematuria.[2]

4. Cultures made in over forty operating rooms in sixteen states showed the widespread distribution of pathogenic bacteria in the air of operating rooms and suggested that such a condition is universal.[3]

5. Operating room air contamination with staphylococci (over 90 per cent of all organisms recovered) was in general highest during the colder months and lowest during the summer. Also during the summer the hemolytic Staphylococcus aureus was much less frequently recovered from the air.[4]

6. Severe staphylococcic wound infections occurred almost entirely not only during the colder months but during the periods in the colder months when the air contamination with Staphylococcus aureus, particularly the hemolytic, was highest.[1]

7. Quantitative studies to determine the degree of nose and throat contamination of 10 men, and to correlate this with the degree of air contamination of the room in which they worked, showed the two conditions to be roughly parallel over a period of twelve months during which the study was carried out. This held not only for gross numbers but also for the flora, particularly the presence or absence of hemolytic yellow staphylococci.[2]

8. Severe streptococcic throat infections were rare and streptococcic wound infections occurred in only 5 per cent of the total infections in clean operative wounds. Most of these were in one surgical specialty service.[1]

9. Cultures of the freshly prepared hands of the personnel or skin of the operative region seldom showed a positive growth, but after an operation on a hot day many staphylococci (usually a pure culture of Staphylococcus albus) could be cultured from the skin of the patient or the hands of the operating team.[5]

10. During the summer months when perspiration was most profuse but the nose and throat contamination was low, severe infections were rare and there was no fatal infection in a clean wound.[6]

11. Sedimenting bacteria recoverable on an exposed plate of blood agar diminish rapidly after cessation of occupancy and dropped from fifty to one hundred or more colonies per hour of exposure during occupancy to zero to four colonies as an average of many expo-

From the Department of Surgery, Duke University School of Medicine and Duke Hospital.

1. Hart, Deryl, and Upchurch, Samuel E.: "Unexplained Infections" in Clean Operative Wounds: The Importance of the Air as a Medium for the Transmission of Pathogenic Bacteria and Bactericidal Radiation as a Method of Control; Analysis of Over 5,000 Operations Covering a Period of Ten and One Half Years, Ann. Surg., to be published.

2. Hart, Deryl, and Schiebel, Herman M.: Role of the Respiratory Tract in Contamination of Air: A Comparative Study, Arch. Surg. **38:** 788-796 (April) 1939.

3. Hart, Deryl: Pathogenic Bacteria in the Air of Operating Rooms: Their Widespread Distribution and the Methods of Control, Arch. Surg. **37:** 521-530 (Oct.) 1938.

4. Hart, Deryl, and Gardner, C. E., Jr.: Sterilization of the Air in the Operative Region with Bactericidal Radiant Energy: Results in Its Use in Two Hundred and Eighteen Operations, Tr. South. S. A. **49:** 376, 1937. Hart and Schiebel.[2]

5. Hart, Deryl, and Upchurch, S. E.: Postoperative Temperature Reactions: Reductions Obtained by Sterilizing the Air with Bactericidal Radiant Energy; Seasonal Variations, Ann. Surg. **110:** 291-306 (Aug.) 1939.

6. Hart, Deryl: Sterilization of the Air in Operating Room with Bactericidal Radiation: Results from Nov. 1, 1938 to Nov. 1, 1939 with a Further Report as to Safety of Patients and Personnel, Arch. Surg. **41:** 334-350 (Aug.) 1940. Hart and Upchurch (footnotes 1 and 5).

sures after eighteen to twenty hours. The latter number could not be appreciably increased by stirring up the air in the well kept operating room with electric fans.[2]

12. As soon as the room was reoccupied the air contamination rose rapidly.[2]

13. Other things being equal, the degree of air contamination varied directly with the duration of occupancy, the number of occupants and the degree of nose and throat contamination of the occupants and was further influenced by the amount of activity and talking and by the efficiency of the ventilating system in supplying to the room air free of bacteria.[7]

14. The conventional gauze mask did not prevent this air contamination. Experimentally it would not stop these bacteria when they were atomized into the air of an experimental apparatus, the air of which was then filtered through the mask.[8]

15. The degree of contamination of the front of the operating uniform (nurses, doctors or orderlies) varies directly with the nose and throat flora of the wearer and the length of time the uniform has been worn. These uniforms for all personnel should, of course, be freshly laundered each day.[1]

From these facts we were forced to the conclusion that pathogenic bacteria given off from the noses and throats of the occupants of the modern well run operating room, floating in the air and sedimenting on the sterile field comprise the greatest breach in our present day aseptic technic and present the greatest hazard of infection in large operative wounds. This is particularly true in those wounds in which hemostasis may be inadequate, trauma inevitable and immobility and other more or less ideal conditions for wound healing impossible to obtain.

Many measures were undertaken in an attempt to control this air contamination, with only partial success until we began killing the bacteria in the air and on the sterile field with ultraviolet radiation. Some of the more important of these were as follows:

1. The ventilating system without recirculation of air was run continuously during operations, thus supplying the operating room with washed and filtered air free of pathogenic bacteria in an attempt to displace or dilute the contaminated air.

2. No visitors were allowed, and the personnel was kept to the minimum.

3. Masks were worn at all times regardless of whether or not an operation was in progress, and double masks were worn during large clean operations.

4. Talking was reduced to the minimum.

5. Powder for gloves was discontinued to avoid this source of dust.

6. The rooms were painted frequently and washed daily, and the floors were mopped with an antiseptic after each operation.

7. Large clean operations were performed only as the first operation in the morning after the room had been unoccupied for fifteen to twenty hours.

8. An attempt was made to eliminate all carriers of yellow staphylococci from the operating rooms for large clean operations, but this was not practical because of the transient character of the nose and throat contamination in many cases. However, all persistent carriers of the hemolytic Staphylococcus aureus were eliminated.

9. Large clean wounds were thoroughly washed out and irrigated with large amounts of sterile physiologic solution of sodium chloride but without removing enough of the contaminating bacteria to avoid suppuration in all cases.

10. Chemotherapy in the form of methylrosaniline to inhibit the growth of gram-positive cocci was tried but without evident improvement in our results.

11. Finally, in desperation we refused to perform certain large clean operations such as thoracoplasties except during the warmer months when the air contamination was persistently low.

12. Plans were under way to try immunization of prospective thoracoplasty patients against the hemolytic Staphylococcus aureus but were not carried out because of the satisfactory results obtained with air sterilization.

Since we were convinced that every patient having a large clean operation had many pathogenic bacteria dropping into his wound or onto the sterile supplies that entered the wound and that the matter of infection was determined by the local and general resistance of the patient and the virulence of the organisms, we lost confidence in our "ritual of aseptic technic." As a result of the limitation of certain operations such as extrapleural thoracoplasties to the warmer months, and the replacement of other larger operations with less extensive procedures such as alcohol injections instead of section of the fifth nerve, there was a curtailment in the number of the larger operations performed at a time when the surgical service as a whole was growing rapidly.

TABLE 1.—*Reduction in Percentage of Infected Wounds*

	Without Radiation		With Radiation
a. Thoracoplasties and radical mastectomies from	32%	to	0.35%
b. Orthopedic operations from	17%	to	0.74%
c. Craniotomies and laminectomies from	9%	to	0.22%
d. Herniorrhaphies from	8.3%	to	0.00%
e. Thyroidectomies from	1.8%	to	0.00%

After discussing the feasibility of constructing an operating room with all air currents from other parts of the hospital eliminated and with high transmission glass for the walls and roof to let in the sunlight, we turned to artificial sources of ultraviolet radiation to destroy the bacteria in the air of the existing operating rooms as an experiment to prove or disprove our conclusions that the bacteria in the air were our chief source of danger and that the so-called unexplained infections could to a large extent be eliminated by control of this source of contamination. We have never felt that ultraviolet radiation was more than a means of attaining the desired goal of a low air contamination, although there may be some beneficial effect obtained from the direct exposure of the wound which might not be obtained if other means of obtaining a low air contamination are used. At the present time there seems to be no other method of controlling air contamination that is relatively so simple and safe. The cooperation of the Lamp Division of the Westinghouse Electric and Manufacturing Company was secured and it has furnished us with the basic equipment of transformers and radiation tubes, the latter with over 85 per cent of their output at 2,537 angstroms and with a very low ozone production.

7. Hart, Deryl: Sterilization of the Air in the Operating Room by Special Bactericidal Radiant Energy, J. Thoracic Surg. **6**: 45 (Oct.) 1936; Operation Room Infections, Arch. Surg. **34**: 874-896 (May) 1937; Pathogenic Bacteria in the Air of Operating Rooms.[3]

8. Hart, Deryl: Studies on Effectiveness of the Mask as a Bacterial Filter (unpublished experiments).

The bactericidal effect of this wavelength approaches the maximum that can be obtained with ultraviolet radiation, while the burning effect is relatively low as has been shown by other observers. Radiation of this wavelength is also available in a high degree of purity from a relatively inexpensive source.

After determination by suitable experiments that approximately 30 microwatts per square centimeter of this radiation at the operative site would (1) within less than three minutes kill over 99 per cent of all the usual pathogenic bacteria sprayed on a Petri dish of blood agar and exposed at this site, (2) not appreciably damage the exposed tissues of an animal during the course of the usual operation and (3) with eighty minutes of exposure cause not more than a transient erythema on the skin of a blond,[9] we began operating on patients in such a field.

TABLE 2.—*Reduction in Percentage of Patients with Temperature Above 100.4 F. Following Certain Types of Operations*

	Without Radiation		With Radiation
a. Thoracoplasties	68%	to	30%
b. Radical mastectomies	46%	to	34%
c. Inguinal herniorrhaphies	36%	to	22%

We have since used radiation intensities on the operative wound varying from 18 to 32 microwatts per square centimeter (for a few operations as much as 60 microwatts per square centimeter, but this was given up because of difficulty in protecting the personnel, not from any evident damage to the patient—burning of the skin or tissues, or impairment of wound healing) in over 3,000 cases and have never seen the slightest evidence of damage to the patient in any way. With different installations we have had various intensity distributions throughout the remainder of the operating room. Some of these allowed as many as fifteen to eighteen colonies of sedimenting bacteria in a Petri dish per hour of exposure to survive at the periphery of the room, while others never allowed the survival of more than an average of four colonies per Petri dish in an hour of exposure for six consecutive exposures at any point in the room. With all units the number of surviving colonies of bacteria in a Petri dish per hour of exposure at the operative site varied from zero to four. All intensity distributions have given satisfactory results, with the elimination of wound infection as the criterion. In fact, the results have been so good with the wound infection rate following clean primary incisions where radiation was used (less than 0.25 per cent) that it would be impossible without many thousands of operations to use the infection rate as a criterion as to which intensity distribution is most desirable. We have therefore used as our primary criterion for the best installation the one that will give a very low survival rate of bacteria sedimenting on exposed Petri dishes of blood agar both in the sterile field and throughout the entire room. Our second criterion for the most desirable radiation intensity distribution has been the lowest possible intensity of radiation at the site of the wound[10] and on the heads of the personnel compatible with the aforementioned low bacterial survival rate throughout the room.

These conflicting demands on the radiation intensity have been reconciled by an intensity distribution obtained in the following manner:

1. The radiation units except for one beneath the operating spotlight in certain rooms were raised from 7 feet 6 inches to 10 feet 6 inches and spaced so as to irradiate the entire room more effectively. By this means we have been able to:

(*a*) Obtain a very high intensity in the upper air above the heads of the personnel.

(*b*) Increase the intensity in all parts of the periphery of the room.

(*c*) Maintain the same or a diminished intensity on the wound (18 to 30 microwatts per square centimeter).

(*d*) Greatly reduce the intensity on the heads of the personnel.

(*e*) Increase the intensity of radiation on the floor where bacteria may sediment.

2. The reserve sterile supplies and instruments were further protected by a high radiation intensity from an auxiliary unit covered with a suitable shield and reflector which limited this high intensity to a field which was only occasionally and transiently entered by the completely covered arm and hand of the nurse. While the intensity used at the operative site is sufficient to kill bacteria sprayed on the surface of a blood agar plate within one to three minutes, the organisms given off by the personnel are swept upward by the convection currents or by the air currents set up by the ventilating system and are subjected to the much higher radiation intensities in upper parts of the room. The organisms which actually come into the field of the reserve supplies or fall on them are again subjected to a radiation intensity much higher than could be tolerated by the wound or by the personnel.

The exposed Petri dish rather than the Wells centrifuge is taken as an index of the efficiency of the radiation unit, since it more nearly approaches the conditions existing on the sterile field during an operation, where the bacteria may be killed either in the air or after they fall on the sterile field.

TABLE 3.—*Reduction in Percentage of Patients with Temperature Above 99.5 F. for More than Four Days Following Certain Types of Operations*

	Without Radiation		With Radiation
a. Thoracoplasties	78%	to	22%
b. Radical mastectomies	54%	to	21%
c. Inguinal herniorrhaphies	46%	to	14%

RESULTS OBTAINED

Any attempt to evaluate the results obtained must take into consideration many factors, and it may be difficult to compare one hospital with another unless specific types of operations are considered. Even then differences in operating technic or other local conditions may result in considerable variations in the infection

9. While this amount of radiation is apparently safe as far as the patient is concerned, it must be kept in mind that the heads of the personnel are exposed to a higher radiation intensity and that they may be subjected to repeated exposures on the same day. Furthermore, the effect of oft repeated exposures might be more serious than that of a single exposure. Therefore it seems imperative that undue exposure of the personnel should not be permitted. During the five and one-half years of experience with this operative technic we have had no one suffer evident permanent damage and have seen only transient dermatitis, and in the first years a few cases of conjunctivitis which healed promptly. These were caused by the tendency of the staff to take undue liberties with something that they came to consider so harmless.

10. It is fully appreciated that in addition to limiting the bacterial contamination the effect of the radiation on the tissues of the wound itself may beneficially affect wound healing. These criteria do not take into account the amount of wound exposure that would be best for healing. If ever we are able to eliminate bacteria from the wound without exposing it to radiation this problem can then be more satisfactorily approached.

rate. In our own hospital 31 per cent of all the deaths from infections in clean wounds during a period of eleven years occurred within three consecutive months and at a time when the service was only 43 per cent of its present size. Furthermore, in any hospital reporting an infection rate of any given percentage an analysis will show wide variations; if this is broken down into the infection rate for various types of operations, such as thoracoplasties, mastectomies, arthroplasties, craniotomies, herniorraphies or thyroidectomies, certain types of operations will show almost no infections and others a rate several times as high as the average. However, in a given hospital with a relatively constant operating personnel, with the exception of changing residents, each of whom has received a similar type of training, improvements in results, with every individual type of operation, beginning simultaneously with the institution of air sterilization and maintained for five and one-half years should be significant. This is all the more so when it is considered that for the preceding five and one-half years the recurring infections persisted despite every effort to control them, with a resultant impairment in the confidence of the staff in "aseptic technic" and a voluntary curtailment in the number of operations performed as a result of the fear of infection. The introduction of air sterilization by ultraviolet radiation in different services at different times caused in each an immediate reduction in the infection rate to from one-twentieth to one one-hundredth of the previous level. By this means the confidence of the staff in the "aseptic technic" has been so largely restored that it now feels that an infection in a "clean wound" is almost the last complication to be expected. As one member expressed it, "The assurance with which one can inspect the temperature chart or the wound without fear of signs of a wound infection far more than compensates for any inconvenience caused by the necessary precautions taken for one's personal protection against the ultraviolet radiation during the operation." These results have now been uniformly good for a consecutive period of five years and eight months since ultraviolet radiation was first used for operations on patients.

The improvements in results in consecutive groups of clean wounds of different types brought about by air sterilization may be presented as follows:

1. A reduction in the percentage of infected wounds.[1] (table 1).

2. A reduction in the percentage of patients having a temperature elevation above 38 C. (100.4 F.) following certain types of operation,[5] as in table 2.

3. A reduction in the percentage of patients having a temperature elevation above 37.5 C. (99.5 F.) for more than four days following certain types of operations,[5] as in table 3.

4. General improvement in wound healing and diminished systemic reaction in patients having all types of operations after the introduction of radiation.

5. The elimination of deaths from infection in clean wounds. There were nineteen deaths [11] from infected wounds in a group of 1,782 large clean operations in which radiation was not used and no death from infection in a consecutive group of over 2,600 similar operations in which radiation was used.[1]

11. Over a period of eleven years and out of a total of almost fifty thousand operations of all types, these nineteen are the only deaths from "unexplained infections" in clean, operative wounds, and they occurred only in special types of large operative procedures, except for 2 debilitated patients each having an exploratory laparotomy, as follows: craniotomy seven, extrapleural thoracoplasty five, orthopedic operations three, exploratory laparotomy two, radical mastectomy one, excision of malignant tumor of the neck one.

CONCLUSIONS

It is felt that the air contaminated by the organisms given off from the noses and throats of the occupants of the operating room today is the greatest breach in so-called aseptic technic and is the cause of the majority of wound infections in well run operating rooms with a relatively good "atraumatic technic."

Ultraviolet radiation (2,537 angstrom units) offers the simplest and most effective means of eliminating this source of danger and in proper intensities can be used without evident danger to the patient or to the well protected personnel.

By this means, over a period of five years and eight months, we have secured improved wound healing, have eliminated deaths from unexplained infections in clean wounds, have reduced unexplained infections to from one-twentieth to one one-hundredth of the previous level and have secured a most gratifying reduction in both the elevation of temperature and the duration of this elevated temperature in patients following operation.

CLINICAL DETECTION OF HEPATIC DISEASE IN HEPATOLENTICULAR DEGENERATION

REPORT OF NINE CASES

WILLIAM H. SWEET, M.D.
SEYMOUR J. GRAY, M.D.
AND
J. GARROTT ALLEN, M.D.
CHICAGO

When Wilson [1] described the first cases of progressive lenticular degeneration in 1912 he noted: "the most curious and the most remarkable feature of this familial disease is the constant presence of a profound degree of cirrhosis of the liver. This hepatic cirrhosis does not reveal itself by any symptoms during life; nevertheless it is always found after death." Since then all investigators [2] have agreed that extensive cirrhosis of the liver is always found at autopsy in the syndrome of hepatolenticular degeneration bearing Wilson's name and that this severe hepatic involvement is a constant, essential and cardinal characteristic of the disease without which the diagnosis cannot be made.

Wilson and Bruce [3] and others [4] expressed the belief, moreover, that hepatic cirrhosis may be the primary disease which actually precedes the lenticular lesions. Reports by Barnes and Hurst [5] and Jendralski [6] indicate that hepatitis may kill a patient before lenticular signs or lesions appear and that this hepatic disease may occupy the foreground before there is any suspicion of a pathologic condition of the central nervous system.

From the Departments of Medicine and Surgery, The University of Chicago.

This work was aided by a grant from the Douglas Smith Foundation for Medical Research.

1. Wilson, S. A. K.: Progressive Lenticular Degeneration: A Familial Nervous Disease Associated with Cirrhosis of the Liver, Brain **34:** 295-509, 1912.

2. Kehrer, F.: Zur Aetiologie und Nosologie der Pseudosklerose Westphal-Wilson, Ztschr. f. d. ges. Neurol. u. Psychiat. **129:** 488-542, 1930. Wilson and Bruce.[3] Barnes and Hurst.[5] Jendralski.[6] Lhermitte and Muncie.[4] Guillain, Fiessinger, Mollaret and Delay.[12] Lüthy.[8]

3. Wilson, S. A. K., and Bruce, A. N.: Neurology, Baltimore, Williams & Wilkins Company, 1940, vol. 2, pp. 806-832.

4. Lhermitte, J., and Muncie, W. S.: Hepatolenticular Degeneration: A Report of Three Unusual Cases, Arch. Neurol. & Psychiat. **23:** 750-760 (April) 1930. Kehrer.[2] Guillain, Fiessinger, Mollaret and Delay.[12] Lüthy.[8]

5. Barnes, S., and Hurst, E. W.: Hepato-Lenticular Degeneration, Brain **48:** 279-333, 1925; **49:** 36-60, 1926; **52:** 1-5, 1929.

6. Jendralski, F.: Der Fleischersche Ring bei Wilsonscher Krankheit, Klin. Monatsbl. f. Augenh. **69:** 750-753, 1922.

It is agreed generally that extensive hepatic disease is present before neurologic symptoms manifest themselves.

In spite of the prominent role attributed to the liver in hepatolenticular degeneration, symptomatic evidence of hepatic disease is slight or entirely absent. Occasionally there is a history of jaundice prior to the onset of nervous symptoms, and Jendralski [6] reported 1 case in which a Kayser-Fleischer ring developed, and death from hepatic cirrhosis and ascites occurred before any nervous symptoms developed. Barnes and Hurst [5] and others [7] have emphasized the paucity of clinical symptoms contrasted with the severity of the cirrhosis and stated that no conclusive clinical evidence of hepatic disease has been obtained in most cases until a postmortem examination was made. The usual tests of hepatic function are particularly disappointing. Lüthy,[8] Wilson and Bruce [3] and Barnes and Hurst [5] reported that the various tests of hepatic function they had performed were entirely inconclusive in demonstrating hepatic insufficiency in this disease.

The purpose of this report is to show that definite evidence of cirrhosis of the liver in cases of the hepatolenticular degeneration of Wilson can be demonstrated conclusively by the newer tests of hepatic function, particularly Gray's [9] serum colloidal gold test and the prothrombin as determined by the serial dilution one stage technic.[10] We also call attention to the frequency of hepatolenticular degeneration.

Five of the 9 patients with hepatolenticular degeneration to be reported on were seen for the first time during the past eight months, and the condition of all but 1 had at some time been mistakenly diagnosed as chronic encephalitis. Patients with hepatolenticular degeneration form excellent material on which to ascertain the delicacy of tests of hepatic function, since the clinical features of the lenticular degeneration in typical cases, in particular those in which there is a tremor which becomes grossly exaggerated on voluntary movement, are sufficiently distinctive to permit a diagnosis of the whole syndrome even in the absence of clinical evidence of disease of the liver.[11] The characteristic neurologic features of this disease, which is often familial and usually manifests itself before the age of 30, are tremor becoming definitely worse with voluntary movement or excitement; muscular hypertonia; masked facies or a fixed smile; slowed movement; occasionally tonic, clonic or torsion spasms; dysarthria; dysphagia, and at times psychic changes.

It might be contended that with any patient presenting only neurologic symptoms there is no way of knowing that hepatic disease is already present. The following evidence favors the conclusion now generally held that the hepatic cirrhosis always occurs first and that the lenticular lesions follow. In the first place, in numerous cases cirrhosis of the liver has been demonstrated either at operation or on physical examination and only subsequently have nervous symptoms developed.[12] Secondly, in several families in which one or more members presented the fully developed picture of hepatolenticular degeneration, others had died early in life from hepatic cirrhosis before neurologic symptoms appeared.[13] In other cases, moreover, there was a definite history of jaundice prior to the onset of any nervous symptoms.[14]

Some of the cases show a further characteristic feature, the so-called Kayser-Fleischer ring, a deposition of yellowish brown or greenish brown pigment in Descemet's membrane near the limbus of one or both corneas, which in the presence of signs of extrapyramidal disease is pathognomonic of hepatolenticular degeneration.[15] In the first 4 cases in the report the Kayser-Fleischer ring was seen on inspection with the naked eye, and the localization to Descemet's membrane was confirmed by study with a slit lamp and corneal microscope. No such pigment was seen in the other 5 cases.

In each of the following cases several complete physical, neurologic and routine laboratory examinations were held, the abnormal features of which will be mentioned subsequently. All 9 patients were white males and, unless it is otherwise stated, gave no family history of any nervous or hepatic disorder. There were no symptoms of acute encephalitis or of cirrhosis, and a normal-sized spleen and liver were found on physical examination in all cases unless otherwise noted. The blood counts and hemoglobin content were uniformly normal. Normal cerebrospinal fluid dynamics, cell count, total protein content, Wassermann reaction and colloidal gold curve were noted in 8 of the 9 cases.

REPORT OF CASES

CASE 1.—S. R., a man aged 29, of Russian-Jewish parentage and with 6 siblings, was referred to the University of Chicago Clinics by Dr. Percival Bailey for studies of hepatic function. At the age of 25 he had noticed an involuntary rhythmic forward and backward nodding of his head during excitement. When he was 26 there appeared a flexion-extension tremor on voluntary movement of the left hand and its fingers. Within a few weeks the proximal muscles of the left arm and all those of the right arm became involved in the tremor, which grew worse steadily. Approximately a year and a half after the onset the patient could no longer feed himself because of the wild thrashing of both arms. The tremor had involved both thighs for eight months and the lower jaw for three months. The patient had had difficulty in speech for about one year. Although he usually walked 10 to 30 miles (16 to 48.2 km.) a day he had had one prolonged attack of pronounced generalized weakness during which he could scarcely take a single step. Since childhood both the patient and his brother had had sialorrhea. For six months he had regurgitated a mouthful of liquid after many meals; he had had anorexia for three months, and he had lost 15 pounds (6.8 Kg.) in the past year.

On examination involuntary movement of some part of the body was usually present even when the patient was lying down at rest, although the muscles involved varied from one fraction of a minute to the next. The most striking feature was the gross increase in amplitude of the tremor on any voluntary movement, with a lesser increase on assumption of any position requiring postural tonus. Wild, uncontrollable, flailing excur-

7. Wilson.[1] Wilson and Bruce.[3] Lüthy.[8]

8. Lüthy, F.: Ueber die hepato-lenticuläre Degeneration, Deutsche Ztschr. f. Nervenh. **123:** 101-181, 1931.

9. Gray, S. J.: Studies on the Colloidal Gold Curve of Blood Serum in Liver Disease, Proc. Soc. Exper. Biol. & Med. **41:** 470-472, 1939; The Colloidal Gold Reaction of Blood Serum in Diseases of the Liver, Arch. Int. Med. **65:** 523-544 (March) 1940.

10. Allen, J. G.; Julian, O. C., and Dragstedt, L. R.: Use of Serial Dilutions in Determination of Prothrombin by the One Stage Technic, Arch. Surg. **41:** 873-878 (Oct.) 1940.

11. Stern, F.: Epidemische Encephalitis, in Bumke, O., and Foerster, O.: Handbuch der Neurologie, Berlin, Julius Springer, 1936, vol. 13, p. 465. Wilson and Bruce.[3]

12. Guillain, G.; Fiessinger, N.; Mollaret, P., and Delay, J.: Sur un syndrome caractérisé par l'apparition d'une encéphalite chronique à prédominance lenticulaire au cours d'une cirrhose hépatosplénique ictérigène, Bull. et mém. Soc. méd. d. hôp. de Paris **54:** 1798-1810, 1938. Barnes and Hurst.[5]

13. Kehrer.[2] Lhermitte and Muncie.[4] Barnes and Hurst.[5] Jendralski.[6]

14. Goldbach, L. J.; Kayser-Fleischer Ring: Wilson's Disease, Am. J. Ophth. **21:** 1118-1128, 1938. Wilson.[1] Lüthy.[8]

15. Josephy, H.: Degeneratio hepato-lenticularis, in Bumke, O., and Foerster, O.: Handbuch der Neurologie, Berlin, Julius Springer, 1936, vol. 16, p. 839. Hall, H. C.: La dégénérescence hépato-lenticulaire, Paris, Masson & Cie, 1921, p. 153.

sions of the upper limbs appeared on any attempt to use them. In the standing position at rest the arms flapped laterally from the sides and the hands swung in wide movements of flexion and extension at the wrists. Other movements involved in the rhythmic tremor were flexion-extension of the head, protrusion-retraction of the tongue and opening-closing of the jaw. Virtually all possible movements of the body from jerks of the individual fingers and the shoulder girdle to movements of the muscles of the abdominal wall and the hamstrings and quadriceps of both thighs were observed. The frequency of the tremor varied from two to four times per second and made rapid alternating movement of the arms impossible. Weakness in the arms was more pronounced proximally than distally. Tonus in all limbs was normal on the rare occasions when there was no superimposed tremor. The speech combined poor enunciation with emission abnormally irregular in rhythm, pitch and amplitude. A rise to a high pitch and occasional sudden loud syllables or words were characteristic.

CASE 2.—J. S., a man aged 28, of Polish parentage and with 4 siblings, had a tremor of the third and fourth fingers of the left hand of two years' duration. This tremor prevented him from holding an object with those fingers. It spread within a few weeks to the rest of the distal muscles and to the proximal muscles of the left arm and within a few months to the opposite arm. The left leg was involved within six months and the right leg and the head within one year. Dysphagia when the patient was reclining soon appeared, and he had to lift his head even to swallow saliva. Within a few months there were present also sialorrhea, dysarthria and weakness in the arms and trunk. Early in his illness he noticed that whenever he felt at all cold a severe generalized shivering appeared. This seemed faster and of less amplitude than his tremor. Ever since puberty he had had so much sebum on his face that girls would tell him to wipe his oily face. For several years he had had only one bowel movement a week without a laxative, and at the onset of his disease he complained of frequent belching.

On examination in December 1939 he showed masked facies, infrequent winking, open mouth and a tendency to sustained smile. His tremor showed the same features of frequent variation in amplitude and shift from one group of muscles to another and the same causes and extent of exacerbation as in case 1. He was able to stop the tremor voluntarily for about a minute, at which time tonus on passive movement was normal. The gait was slowed, and the head and shoulders were bent slightly forward; retropulsion was present. On percussion the liver was found to be small; the lower border was 2 cm. above the costal margin. By June 1940 there were noted deficient convergence, with diplopia at less than 1 foot (30.4 cm.), sluggish pupillary reaction to light on both sides, slowed alternating movements of the tongue and a speech defect strikingly similar to that in the previous case. The patient was often unable to void when he wished to but was never incontinent.

When he lay quietly at complete rest the only tremor was an occasional flexion-extension or abduction-adduction movement of any or all of his fingers, but during static or kinetic muscular activity the tremors involved the head, facial muscles, the torso and all limbs. They were usually much worse on the left side, with a rate varying principally between 2 and 4 per second. Although he was afraid his memory was poor, on the Wechsler-Bellevue intelligence test his verbal intelligence quotient was 121, and his intelligence quotient of 102, as shown by performance in the Arthur test, was above the average. Roentgenograms of his skull were normal. Two electroencephalograms showed slow waves mostly in the cerebellar leads, which are compatible with but not diagnostic of degenerative diseases of the central nervous system. There was also an absence of alpha waves or anything faster.

CASE 3.—S. R. was reported on by Bothman and Rolf[16] four years ago. He was 30 years old, of Polish parentage and the younger of 2 siblings. When he was 19 he first noted a rhythmic tapping of the fingers of the left hand when he was sitting quietly, instead of on voluntary motion, as in the previous cases. The tremor spread to the head and all the limbs, and difficulties in speech appeared, all of the same character and with the same exacerbation on movement as in cases 1 and 2. Although by 1934 there was severe action tremor of his arms on testing or even when walking, he had no tremor when playing football or baseball. Akathisia was present.

On Dec. 22, 1934 there was a tonic spasm in which the legs and arms all became so rigid that he was unable to move them, and his eyes rolled upward so far that he could not see. He was conscious during the two minutes of the spasm. In addition he had several attacks in which his "mind was blank" and he was unable to move his eyes away from an object for three to four minutes. After a pneumoencephalogram in 1934 he was improved for a year, but then progression of the disorder recurred. Dysphagia and urinary incontinence appeared. What were at first thought to be nystagmoid jerks of the eyes could not be correlated with any disturbance of the vestibular apparatus, and caloric and audiometric tests gave normal results. The involuntary movements of the eyes increased in extent, and the eyes tended to turn up when the patient winked. By May 1940 it was apparent that these movements were similar in type to the tremors elsewhere. Although the jerks were always conjugate deviations of both eyes, there was usually no quick component of motion, as in nystagmus, and the amplitude was often grossly irregular from jerk to jerk. Voluntary movements of the eyeballs or any attempt to maintain them in one position, even that of rest, caused a definite increase in the involuntary movements. This was striking on ophthalmologic examination. The tremor also involved facial, masticatory and glossal muscles, lateral rotators and flexor-extensors of the head and practically all the muscles in the arms. The legs showed gross flappings on the attempt at forming the heel to knee position but were quiet at rest. Tonus in all limbs was only slightly increased. Dysdiadokokinesis was present in both arms and legs. During 1940 memory, reasoning and emotional control became severely impaired. Pneumoencephalograms taken after this development showed no change on comparison with the films made in 1934. One hundred and eighty cc. of cerebrospinal fluid was obtained, and the third ventricle was dilated on both occasions.

This is the only patient in the series with any abnormality of the spinal fluid: There were a total protein content of 48 mg. per hundred cubic centimeters and a colloidal gold curve of 0001220000 in October 1934 and a total protein content of 53 mg. per hundred cubic centimeters and a gold curve of 0012321000 in May 1940. In addition to the corneal pigmentation there was an abnormally deep brown color in the exposed portions of the skin of the face, neck and hands. On the dorsum of the hands there was a grayish blue tint superimposed on the brown, particularly in the first intermetacarpal space. A biopsy of this skin was made by Dr. S. W. Becker. The silver stain showed a moderate amount of melanin in the basal layer of the palmar epithelium, with a few dendritic cells indicating a chronic process with little activity. There was almost no pigment in the chromatophores, but a few granules of pigment could be seen throughout the entire thickness of the epidermis, including the stratum corneum. The prussian blue reaction was negative for hemosiderin. Other patients have shown such dermal coloration.[17]

CASE 4.—J. S., a youth aged 19, a university student, with 2 siblings, began in January 1940 to complain of polydipsia, excessive salivation, urinary incontinence, dull epigastric pain, insomnia, crying spells at night, easy fatigability and apathy. Only after several months did a full clinical picture of Wilson's disease develop, with masked facies, open mouth, dysphagia, harsh speech in a low monotone, cogwheel rigidity in the right arm and tremor in the left hand which was increased on voluntary movement. His unusual course has been reported in detail by Babcock and Brosin.[18]

CASE 5.—N. G., a man aged 23 who had an Italian father and a Serbian mother and had 5 siblings, began to notice a tremor in the proximal part of the left arm when he was 14 years old. Within a few months the tremor involved the left leg also. It began on any attempt to use the left limbs

16. Bothman, L., and Rolf, D. E.: The Kayser-Fleischer Ring in Wilson's Disease and Microcephaly, Am. J. Ophth. **19**: 26-33, 1936.

17. Lüthy.[9] Hall.[15]

18. Babcock, C. G., and Brosin, H. W.: To be published.

and was particularly marked on attempts at fine movements. About three years after the onset, propulsion in the gait appeared. Within another year all movements were abnormally slow, a side to side tremor of the head was present during voluntary movements and oculogyric crises appeared. At first these came on only when the patient was looking upward; later, at any time. The patient could force the eyes downward temporarily, but they would return upward for the duration of the attack, which lasted as long as fifteen minutes. An attack occurred every one to three months. When the patient was 19 the tremor spread to the right arm, and there was one attack of weakness in the legs lasting for four days, during which the patient could hardly walk.

At the first examination, in June 1936, the face was covered with acne and comedos and the hair was coarse and oily. A fixed facial grin was usually present. Ocular convergence was diminished, and the pupillary reaction both on convergence-accommodation and to light was poor. The patient spoke in a monotone, slurring test phrases. At rest there was no tremor at all, but it appeared under the same circumstances as in the first 3 cases. There were dysdiadokokinesis and moderate weakness of the left limbs. He walked with his head and shoulders bent forward, swinging the left arm less than the right. Five separate examiners found complete left hemihypalgesia. A pneumoencephalogram was normal.

During the next four years the tremor became worse slowly and spread to the right leg. Increased lassitude prevented the patient from doing simple household chores. By May 1940 the lateral rotators of the head and both proximal and distal muscles of all four limbs were involved in the tremor. Slapping movements on performing the finger to nose test on the left side had an amplitude of about 6 inches (15.2 cm.). There was cogwheel rigidity on passive extension of the forearms, hands and left leg and on passive flexion of the left hand and its fingers as well. The tremor and rigidity were much worse on the left side, and the tremor was present in some parts of the left arm even when the patient was at rest. The hypalgesia had disappeared.

Case 6.—R. M., a man aged 27 whose grandparents were all German, began in June 1936, at the age of 23, to have uncontrollable jerks of the legs. The movements were at first noticed only when the patient executed critical actions, as in releasing the clutch while driving. These uncontrollable movements gradually progressed, so that by December of that year he was unable to walk, and he has since remained bedridden. In the summer of 1936 the eyes began to jerk whenever he wished to use them for fine work, and difficulty in reading has persisted because of this. In November 1936 the tremor spread to the left arm and his speech became difficult. The utterance of each word was an effort but when successful was likely to be a yell. In November 1936 his intelligence quotient was only 82. The speech difficulty improved, but all other symptoms gradually progressed. An electroencephalogram on Dec. 1, 1938 showed some slow waves of obscure significance.

On examination in June 1940 the patient showed the same type of involuntary ocular movements as were seen in case 3, but they were more severe. In the resting position or on gaze in any direction the motions were vertical, rotary or horizontal. On excitement they approached 90 degrees in amplitude. Convergence was impossible. At rest only a mild pronation-supination tremor of the left forearm and irregular excursions of the left toes and foot were present, but on voluntary movements of the left arm and both legs these limbs jerked in wide arcs. A side to side tremor of the head was present. The abdominal and erector spinae muscles were so rigid that the spine could neither be bent nor be twisted passively or actively, but the tonus in the other muscles was almost normal. The voice was irregularly loud and then low, and of high-pitched, rasping quality. Articulation and rhythm of word utterance were normal. Numerous comedos were present.

Case 7.—R. W., a boy aged 12, of Russian Jewish parentage and the youngest of 7 siblings, walked at the age of 14 months but did not start talking until the age of 5 years. One year later a tremor began in both arms. About three years after that a tremor of the head and propulsion appeared, and in another three years the tremor involved both feet. For the first six months of 1940 occasional bouts of epigastric pain, severe enough to make the patient refuse food, and frequent attacks of vomiting after any excitement were noted, presumably due to his cirrhosis.

On examination in June 1940 there were found partial loss of convergence, masklike facies, slurring of polysyllabic words, monotonous speech, lingual dysdiadokokinesis and probable Babinski reflexes in both feet. There was no tremor when the patient lay in bed, but a side to side tremor of the head was seen when it was held up. On the finger to nose test the tremor involved only the pectoralis major and the pronator-supinator muscles of the forearm. A tremor of wide amplitude appeared most strikingly on attempts to write with either hand. The head, shoulder, arm and occasionally the pronator-supinator muscles in the forearm on the corresponding side shook violently. A gross tremor on the toe to examiner's finger test was present in both legs. On the revised Stanford-Binet test the intelligence quotient was only 67. Roentgenograms of the skull and pneumoencephalograms were normal.

Case 8.—L. W., a man aged 20, of American parentage and with 3 siblings, noted at the age of 17 that individual movements of the fingers of the left hand were difficult, that all fingers wanted to move together and that the left hand tended to fall into flexion. Gradually slowness and awkwardness spread to the proximal muscles of the left arm, but not until two years later did an action tremor of the left hand and its fingers begin. Stiffness of the left leg appeared next. At the age of 20 the muscular fascicles of the left thigh and calf began to jerk occasionally when the patient was at rest. These movements were insufficient to move the limb and were most likely to occur after exercise.

On examination active movements of the left side of the face and of the whole left upper limb appeared slow and weak. During walking the left leg dragged, and the left arm did not swing. There was cogwheel rigidity on passive movement of all joints of the left arm from the elbow down, and on dorsiflexion of the left foot. Lead-pipe rigidity was found at the other joints of the left lower limb and at the left shoulder. With the patient at rest the only involuntary movement was an irregular jerking from side to side of one or the other of the fingers of the left hand. On any voluntary movement of the left arm a tremor appeared, chiefly in the proximal muscles. During conversation there was often a tremor of the mandible or of the muscles around the left corner of the mouth. On strong contraction of both platysmas there was a coarse tremor of the whole left muscle. All tendon reflexes on the left were hyperactive. Roentgenograms of the skull were normal. Although there was no evidence of mental decline in the history or examination, the pneumoencephalogram revealed widened cerebral sulci "probably conclusive of cortical atrophy."

Case 9.—H. W., seen by us through the courtesy of Dr. Hassin and Dr. Chesrow, was a man aged 32, of American parentage. His father had paranoia and chronic alcoholism. The 7 paternal uncles and aunts in various parts of the country were all healthy, but each had had a child which had had "brain fever" in the first few years of life. Six of the 7 children died, and the seventh was deaf and dumb after her attack. The patient was also said to have had "brain fever," at the age of 6 months.

Between the ages of 1 and 4 years he began to have involuntary movements on action in all four limbs and trunk, did not walk alone until the age of 6 years and then walked as though intoxicated. When he was 11 years old, in 1919, walking became more and more difficult, and by 1932 he was no longer able to walk. The involuntary movements of the upper limbs prevented him from feeding himself except between the ages of 12 and 15 years. His speech, although difficult as long as the patient could remember, had become worse in the past year and had recently become uncontrollably loud and indistinct whenever he was excited. Kyphoscoliosis had been observed since an early age. For seven years there had been intermittent difficulty in urination. Dysphagia had been noted for two years, with food occasionally going up into the nose.

On examination in July 1940 the only involuntary movement the patient showed at rest was an occasional rotation of the right arm, but his resting posture was distorted. The head was tilted to the right. The right hand was placed about 6 inches lateral to the head, the forearm supinated and the hand and fingers flexed. The left arm had no abnormal posture. Both legs were drawn up markedly in flexion at the hip and knee. The legs were inclined to the left and dorsiflexed at each ankle. The toes of the right foot were held in plantar flexion, while the toes of the left foot, especially the second one, were in dorsiflexion. The parts could all be moved actively to normal positions but tended to return to the posture described. Severe kyphoscoliosis of the left lower thoracic and upper lumbar regions and bilateral pes cavus could not be altered by active movements.

On voluntary movement of either arm there were an associated opening of the mouth with elevation of its right corner, torsion of the trunk to exacerbate the scoliosis and extension of the head and extreme flexion of the corresponding forearm and hand with a terminal tremor of the hand and fingers. The execution of the intended act was consequently difficult. On an attempt to grasp an object with the right hand the fingers often hyperextended first. When the hyperextension had been overcome and the object grasped, the hand was then hyperflexed. Heel to knee movements could be executed on each side despite a gross tremor and simultaneous contractions of all muscles in the active thigh and leg. There was severe atrophy and weakness of all four limbs. An increased resistance to passive flexion of the right forearm and extension of the right wrist was seen. The speech impairment was similar to that in case 1. On several tests of memory of recent events the patient was definitely subnormal. An earlier diagnosis had been post-encephalitic dystonia musculorum deformans, but the history of familial cerebral disease is at least as striking as the possibility of encephalitis, and the marked exacerbation of the involuntary movements on action is typical of cases of dystonia musculorum deformans in which hepatolenticular degeneration has been proved at autopsy.[19] Our positive results in tests of hepatic function point to hepatolenticular degeneration.

This series of 9 cases illustrates virtually all the possible neurologic manifestations of the disorder. Among them several unusual clinical features were present. Patients 3 and 6 showed a type of involuntary movement of the eyeballs similar to that seen in the limbs. Attacks of oculogyric crises occurred in case 5 on numerous occasions and in case 3 on one occasion only in conjunction with a generalized tonic spasm. Nystagmus and slow, jerky or paretic movements of the eye all have been mentioned heretofore,[8] but we have found no previous cases in which involuntary movement of the eyeballs and oculogyric crises have been observed. Likewise absent from other reports has been mention of the attacks of generalized weakness without concomitant muscular spasm which we noted in cases 1 and 5. The absence of a familial history of the same disease in 8 of the 9 cases is unusual also.

In spite of the extensive cirrhosis of the liver which precedes the neurologic symptoms and is always found at autopsy, tests of hepatic function and other studies of hepatic insufficiency have failed, heretofore, to reveal conclusive evidence of pathologic conditions of the liver in hepatolenticular degeneration.[20] In an effort to demonstrate this hepatic cirrhosis during life we selected the more recent sensitive tests of hepatic function and investigated additional evidence of disease of the liver by supplementary chemical studies of the blood. The latter included determinations of the plasma bilirubin, albumin, globulin, cholesterol and cholesterol esters. The studies of hepatic function consisted of those on the galactose tolerance, bromsulphalein retention, five hour dextrose tolerance, hippuric acid excretion, bilirubin excretion, prothrombin time and colloidal gold reaction of the serum.

No evidence of clinical or subclinical jaundice was found in any of the patients with hepatolenticular degeneration. The plasma bilirubin was normal in every case studied except 1 (table 1, case 1), in which a slight increase of the plasma bilirubin above the normal of 1 mg. per hundred cubic centimeters was found. The van den Bergh reaction was normal throughout.

An increase in plasma globulin with a decrease in plasma albumin is associated not infrequently with chronic hepatic disease, particularly with cirrhosis of the liver.[21] The plasma proteins in our series, however, were normal in all but 2 cases (table 1, cases 3 and 7), in which the plasma globulin was elevated above 2.8 Gm., the upper limit of normal, and the albumin diminished below the normal level of 4 Gm.

Thannhauser and Shaber[22] first called attention to the low ratio of the blood cholesterol esters to total cholesterol in hepatic disease. Normally the cholesterol esters constitute at least 40 per cent of the total cholesterol. Jezler and others[23] have confirmed the abnormally low ratio of cholesterol to cholesterol esters in many cases of portal cirrhosis. One of us[9] has shown that this low ratio is more frequent in the acute parenchymatous diseases than in chronic cirrhosis of the liver. In the 7 cases of hepatolenticular degeneration studied, an abnormal ratio was found in only 2 cases (table 1, cases 4 and 6). In the remaining 5 the ratio was within the lower limits of normal.

Practically all reports have indicated that the galactose tolerance test[24] is a useless index of hepatic function in the absence of jaundice.[25] Our results are in accord with this concept. The galactose tolerance test gave normal results in the 5 cases in which it was performed.

Although the bromsulphalein test[26] has been reported by some investigators[27] to yield a high percentage of positive results in cases in which there is clinical evidence of early hepatic cirrhosis, our results with this test were disappointing. Only 2 patients retained

19. Barkman, A.: Etude clinique sur un cas appartenant au groupe pathologique de la dégénerescence hépato-lenticulaire de Hall, Acta med. Scandinav. **67:** 236-285, 1927. Jakob, A.: Zur Frage der nosologischen und lokalisatorischen Auffassung der torsionsdystonischen Krankheitserscheinungen, Deutsche Ztschr. f. Nervenh. **124:** 148-153, 1932.

20. Wilson and Bruce.[3] Barnes and Hurst.[5] Lüthy.[6]

21. Abrami, P., and Robert-Wallich, R.: Modifications de sérum sanguin au cours des cirrhoses du foie avec ascite. Inversion du rapport sérines-globulines, Compt. rend. Soc. de biol. **101:** 291-293, 1929. Salvesen, H. A.: Variations in the Plasma Proteins in Non-Renal Conditions, Acta med. Scandinav. **72:** 113-123, 1929. Wiener, H. J., and Wiener, R. E.: Plasma Proteins, Arch. Int. Med. **46:** 236-265 (Aug.) 1930. Myers, W. K., and Keefer, C. S.: Relation of Plasma Proteins to Ascites and Edema in Cirrhosis of the Liver, Arch. Int. Med. **55:** 349-359 (March) 1935. Foley, E.; Keeton, R. W.; Kendrick, A. B., and Darling, D.: Alterations in Serum Proteins as an Index of Hepatic Failure, Arch. Int. Med. **60:** 64-76 (July) 1937.

22. Thannhauser, S. J., and Shaber, H.: Ueber die Beziehungen des gleichgewichtes Cholesterin und Cholesterinester in Blut und Serum zur Leberfunction, Klin. Wchnschr. **5:** 252-253, 1926.

23. Jezler, A.: Cholesterinbestimmungen im Blut als Leberfunktionsprüfung, Schweiz. med. Wchnschr. **19:** 108-110, 1938. Epstein, E. Z., and Greenspan, E. B.: Clinical Significance of Cholesterol Partition of Blood Plasma in Hepatic and in Biliary Diseases, Arch. Int. Med. **58:** 860-890 (Nov.) 1936. Israel, H. L., and Reinhold, J. G.: Detection of Cirrhosis and Other Diseases of the Liver by Laboratory Tests, J. Lab. & Clin. Med. **23:** 588-596, 1938.

24. Shay, H.; Schloss, E. M., and Rodis, I.: II. The Galactose Tolerance Test in the Differential Diagnosis of Jaundice, Arch. Int. Med. **47:** 650-659 (April) 1931.

25. Herman, E.: Die Galaktoseprobe bei Leberzirrhose, Wien. klin. Wchnschr. **46:** 1230-1231, 1933. Soffer, L. J.: Present Day Status of Liver Function Tests, Medicine **14:** 185-254, 1935. Snell, A. M., and Magath, T. B.: The Use and Interpretation of Tests for Liver Function, J. A. M. A. **110:** 167-174 (Jan. 15) 1938.

26. O'Leary, P. A.; Green, C. H., and Rowntree, L. G.: Diseases of the Liver: VIII. The Various Types of Syphilis of the Liver with Reference to Tests for Hepatic Function, Arch. Int. Med. **44:** 155-193 (Aug.) 1929.

27. Robertson, W. E.; Swalm, W. H., and Konzelmann, F. W.: Functional Capacity of the Liver: Comparative Merits of the Five Most Popular Tests, J. A. M. A. **99:** 2071-2077 (Dec. 17) 1932. Bauman, L., and Orr, L.: Bromsulphalein Test Checked with Liver Histology, New York State J. Med. **38:** 1161, 1938. Footnote 25.

10 per cent or more of the dye thirty minutes after an intravenous injection of 5 mg. per kilogram of body weight (table 2, cases 3 and 7). One of these 2 had shown a normal retention of dye five years previously, although he had demonstrated definite nervous symptoms at that time (table 2, case 3).

Von Fejér and Heténi [28] first reported a diabetic-like type of dextrose tolerance curve with hepatic damage. This work has been confirmed for cirrhosis of the liver by Coller and Troost,[29] Jacobi [30] and Coller and Jackson.[31] They concluded that hepatic disease produces an abnormal dextrose tolerance curve characterized by a normal or low level of the blood sugar during fasting, a high level of blood sugar during the first or second hour and hypoglycemia during the fourth and fifth hours, the so-called inverted V type of curve.

Definitely abnormal dextrose tolerance curves were found in 4 of our 6 patients (table 2, cases 1, 2, 3 and 4). The level of capillary blood sugar during fasting was normal in every case, but in 4 of the 6 cases there was subsequent hyperglycemia, the sugar content becoming more than 200 mg. per hundred cubic centimeters within two hours, with a return to a normal level within three hours in all but 2 cases (table 2, cases 3 and 4), in which the hyperglycemia persisted. No definite hypoglycemic phase was noted except in 2 cases (table 2, cases 2 and 5), in which the level of capillary blood sugar fell below 60 mg. per hundred cubic centimeters. Two patients in this group did not show the characteristic hyperglycemic phase (table 2, cases 5 and 8), but the dextrose tolerance curves were not entirely normal, because of mild hypoglycemia in one and a somewhat delayed return of the level of capillary blood sugar to normal in the other. The many factors entering into the metabolism of dextrose, including long-standing malnutrition and chronic loss of weight, make this curve a difficult one to interpret. The finding by Robinson and Shelton [32] of many diabetic-like curves for patients with nervous and mental diseases makes our series particularly difficult to evaluate.

TABLE 1.—*Studies on Hepatic Function in Hepatolenticular Degeneration*

Case	Patient	Plasma Bilirubin, Mg. per 100 Cc.	Plasma Albumin/ Globulin, Gm. per 100 Cc.	Plasma Cholesterol/ Cholesterol Esters, Mg. per 100 Cc.	Galactose Tolerance	Bromsulphalein Retention
1	S. R.	1.51	4.27/2.58	185/81	1.2	Normal
2	J. S.	0.89 0.79	4.28/2.84	145/56	0.0	Normal
3	S. R.	0.73	3.49/3.01	202/96(1935) (1940)	2.5 1.2	Normal (1935) 10% 1940)
4	J. S.	0.63	4.02/2.32	201/75	...	Normal
5	N. D.	0.17	4.82/2.12 4.64/2.17	173/80 179/76	0.53	Normal
6	R. M.	....	4.35/2.48	153/54	...	.....
7	R. W.	0.86	3.90/2.90	168/67	...	100%
8	L. W.	0.85	4.31/1.73	.....	0.60	Normal
9	H. W.	....	.....	.....	...	.....

28. von Fejér, A., and Heténi, G.: Stoffwechselstudien an Leberkranken: I. Mitteilung. Untersuchungen über den Zuckerstoffwechsel der Leberkranken, Ztschr. f. d. ges. exper. Med. **42:** 670-677, 1924.

29. Coller, F. A., and Troost, F. L.: Glucose Tolerance and Hepatic Damage, Ann. Surg. **90:** 781-793, 1929.

30. Jacobi, H. G.: Glucose Tolerance as a Diagnostic Aid in Jaundice, Surg., Gynec. & Obst. **63:** 293-297, 1936.

31. Coller, F. A., and Jackson, H. C.: Surgical Aspects of Hypoglycemia Associated with Damage to the Liver, J. A. M. A. **112:** 128 (Jan. 14) 1939.

32. Robinson, G. W., Jr., and Shelton, P.: Incidence and Interpretation of Diabetic-Like Dextrose Tolerance Curves in Nervous and Mental Patients, J. A. M. A. **114:** 2279-2283 (June 8) 1940.

The hippuric acid excretion test introduced by Quick [33] in 1933 is considered a reliable test for hepatic cirrhosis.[34] Excretion of less than 3 Gm. of benzoic acid in the urine within four hours of the oral administration of 5.9 Gm. of sodium benzoate to patients with normal renal function indicates hepatic disease. We found the reactions to this test positive in 3 of the 7 cases studied (table 2, cases 1, 4 and 8). One patient (table 2, case 7) vomited the sodium benzoate.

TABLE 2.—*Tests of Hepatic Function in Hepatolenticular Degeneration*

Case	Patient	Dextrose Tolerance, Capillary Blood Sugar; Mg. per 100 Cc.; Hours After Injection							Hippuric Acid Excretion; Gm. of Benzoic Acid Excreted	Bilirubin Excretion, Percentage Retained	Prothrombin Time, Percentage of Normal	Serum Colloidal Gold Test
		0	½	1	2	3	4	5				
1	S. R.	92	171	231	261	72	77	93	2.80	12.9	48	532
											46	522
2	J. S.	93	210	182	150	58	..	..	....	2.1	..	532
		93	166	205	135	69	76	80	3.31	10.4	68	532
3	S. R.	103	138	138	240	165	86	70	3.04	6.6	72	522
											70	532
											73	521
4	J. S.	78	142	236	162	160	..	..	2.24	0	65	522
		72	193	246	207	134	..	..	....	...	65	532
5	N. D.	67	166	113	...	57	..	72	3.66	16.2	95	522
		76	186	167	93	58	75	73	....	....	..	521
6	R. M.	..	...	...	...	...	..	..	....	....	..	522
												521
7	R. W.	100	179	181	...	...	..	..	1.03	1.1	65	532
												522
8	L. W.	83	151	174	135	96	69	98	2.70	13.8	48	222
												222
9	H. W.	..	...	...	...	...	..	..	....	....	100	532
												522

The intravenous test [35] was resorted to, and the result was normal. Urinary excretion of more than 0.84 Gm. of benzoic acid in one hour is considered normal with this method.

Von Bergmann and Eilbott [36] developed the bilirubin excretion test which Harrop and Barron [37] and others [38] have said is the most delicate single test for impaired hepatic function. Retention of more than 6 per cent of the intravenously injected bilirubin at the end of four hours is considered abnormal. We found this test much more sensitive than any of the previous ones. It gave positive results in 5 of the 8 cases of hepatolenticular degeneration. One patient (table 2, case 2) had a normal excretion of bilirubin when the test was first performed, but after seven months of rapid progression of neurologic symptoms the test gave positive results.

Determination of the prothrombin time has been found by S. J. Wilson [39] to be a much more sensitive indication of hepatic damage than either the hippuric acid or bromsulphalein tests and was noted by Allen and Julian [40] to persist as abnormal in 14 patients with advanced hepatic cirrhosis despite the administration of large doses of a vitamin K-like substance, menadione,

33. Quick, A. J.: The Synthesis of Hippuric Acid: A New Test of Liver Function, Am. J. M. Sc. **185:** 630-635, 1933.

34. Lindeboom, G. A.: Die Hippursäuresynthese als Leberfunktionsprobe, Acta med. Scandinav. **99:** 147-161, 1939.

35. Quick, A. J.: Intravenous Modification of the Hippuric Acid Test for Liver Function, Am. J. Digest. Dis. **6:** 716-717, 1939.

36. von Bergmann, G.: Zur funktionellen Pathologie der Leber insbesondere der Alkohol-Aetiologie der Cirrhose, Klin. Wchnschr. **6:** 776, 1927. Eilbott, W.: Funktionsprüfung der Leber mittels Bilirubinbelastung, Ztschr. f. klin. Med. **106:** 529-560, 1927.

37. Harrop, G. A., and Barron, E. S. G.: The Excretion of Intravenously Injected Bilirubin as a Test of Liver Function, J. Clin. Investigation **9:** 577-587, 1931.

38. Soffer, L. J., and Paulson, M.: Comparative Advantages and Further Modification of Bilirubin Excretion Test for Hepatic Function, Am. J. M. Sc. **192:** 535-540, 1936.

39. Wilson, S. J.: Quantitative Prothrombin and Hippuric Acid Determinations as Sensitive Reflectors of Liver Damage in Humans, Proc. Soc. Exper. Biol. & Med. **41:** 559-561, 1939.

40. Allen, J. G., and Julian, O. C.: Clinical Use of a Synthetic Substance Resembling Vitamin K (2-Methyl-1, 4-Naphthoquinone), Arch. Surg. **40:** 912-916 (May) 1940.

indicating that in the presence of a damaged liver prothrombin was not synthesized normally from vitamin K. In 6 of our 8 cases the prothrombin time was abnormal, a higher positive percentage than was obtained with any of the previous methods. Three patients (table 2, cases 1, 3 and 4) received 2 mg. of menadione four times daily for two to six days without exhibiting any change in the prothrombin time, thus providing further evidence that the abnormal prothrombin time was not due to inadequate intake of vitamin K but to the damaged liver. A large series of normal persons and patients with miscellaneous disorders not remotely involving the liver have shown a prothrombin time of 100 per cent.

The serum colloidal gold test of Gray[9] has given positive results in a higher percentage of cases of clinical cirrhosis of the liver than any other test heretofore reported. Many of these cases of hepatic cirrhosis have been confirmed by autopsy or biopsy. The ease of performance of the test makes the accumulation of an enormous series of control observations possible, over three hundred on normal persons and patients with diseases unassociated with pathologic conditions of the liver. The presence of a normal liver was demonstrated in a large number of these cases at autopsy or biopsy. This series of controls includes patients with numerous miscellaneous neurologic disorders, among which were 6 with paralysis agitans and 4 with parkinsonism following a definite attack of acute epidemic encephalitis. In these disorders the lesions involved the basal ganglions, presumably the same structures affected in hepatolenticular degeneration. In only 1 of the control cases was there an abnormal result, and repetition of this test did not confirm the first positive reaction.

A positive reaction is represented by the flocculation of colloidal gold when serial dilutions of blood serum are added to it, giving a curve (543 or 532) similar to the dementia paralytica curve obtained with spinal fluid. Normally little or no flocculation occurs. The consistently positive results of the serum colloidal gold test in the first cases of hepatolenticular degeneration instigated this study. The test gave positive results on two or more occasions in 8 of the 9 cases. In the 1 case in which the reaction was negative (table 2, case 8), hepatic disease was demonstrated by other methods.

In tables 1 and 2 are summarized the determinations of the blood chemistry and the studies of hepatic function for the 9 cases. Evidence of disease of the liver was found in 8 cases by not less than three different methods, including the presumptive evidence of the abnormal dextrose tolerance test. In 1 case (tables 1 and 2, case 1) six determinations were abnormal: the plasma bilirubin, five hour dextrose tolerance, hippuric acid excretion, bilirubin excretion, prothrombin time and serum colloidal gold reaction. In another case (table 2, case 5), however, only the bilirubin excretion and the serum colloidal gold reaction were abnormal.

Studies of the blood chemistry, galactose tolerance and bromsulphalein retention were of little or no value in detecting hepatic disease, and the hippuric acid test gave positive results in less than half of the cases studied. The tests of the bilirubin excretion and the prothrombin time were found to be reliable indicators of disease of the liver, each giving positive results in all but 2 of the cases studied. The serum colloidal gold reaction appeared to be the most sensitive test for cirrhosis of the liver, demonstrating hepatic disease in 8 of the 9 cases studied.

SUMMARY

1. In 9 cases of hepatolenticular degeneration, illustrating the features of this not infrequent disease, conclusive evidence of hepatic disease was demonstrated by tests of hepatic function for the first time.

2. The serum colloidal gold test of Gray, the prothrombin time and the bilirubin excretion test were found to be more sensitive indicators of hepatic damage in our cases of minimal or no symptomatic evidence of cirrhosis of the liver than the galactose tolerance, bromsulphalein retention or hippuric acid test.

4. Plasma protein levels and the cholesterol, cholesterol ester partition are of little or no value in detecting hepatic disease in cases of hepatolenticular degeneration.

5. The more recent, sensitive methods of detecting hepatic disease may aid in diagnosing hepatolenticular degeneration in cases which have been classified, heretofore, as instances of chronic encephalitis.

Clinical Notes, Suggestions and New Instruments

OSTEOMYELITIS OTHER THAN OF THE TEMPORAL BONE SECONDARILY AFFECTING THE COCHLEAR AND VESTIBULAR STRUCTURES

REPORT OF THREE CASES

MATTHEW S. ERSNER, M.D., AND JULIUS WINSTON, M.D.
PHILADELPHIA

Extratemporal skeletal osteomyelitis is frequently encountered, and osteomyelitis of the diploic temporal bone furnishes no exception. We are cognizant of the fact that when osteomyelitis occurs in the temporal bone the otic capsule and the vestibular and cochlear portions of the auditory nerve may become directly involved. On the other hand, in general osteomyelitis other than that of the temporal bone the otic capsule and the auditory nerve may become secondarily involved by embolic phenomena or by contiguity or toxic absorption, thus creating the symptom complex of tinnitus, vertigo and deafness. When secondary embolic foci occur in the region of the otic capsule, continuity plays an important role in the causation of these symptoms.

The symptoms vary according to the structures involved, the reaction of the patient to the osteomyelitic infection and the degree of toxic absorption. The incipient symptoms may be transient or permanent and may begin with tinnitus, vestibular disturbance or deafness. For these reasons it is essential, on general principles, to take roentgenograms of the temporal bone during any attack of general osteomyelitis whether it is acute or chronic. This should include the Taylor and Stenver positions in order to ascertain whether any osteomyelitic or other changes have taken place in and about the otic capsule.

Frequent otoscopic examinations should also be made for the purpose of noting any changes in the tympanic membrane. It might be well to recall that Bezold observed a pink-tinged ear drum in an early stage of otosclerosis during the period of osteomalacia of the otic capsule and that there was a rapid disappearance of this characteristic finding on subsidence of the osteomalacia. One may therefore hypothesize that, by the same token, the same phenomena may be taking place in the otic capsule during general osteomyelitis.

We offer the suggestion of roentgen and repeated otoscopic examinations in general osteomyelitis in the belief that they will reveal early changes which may be of some significance. We are firmly convinced that many more cases will come to light should such a routine be established.

Read before the otology staff of Temple University Hospital in May 1941.

From the Department of Otology, Temple University School of Medicine.

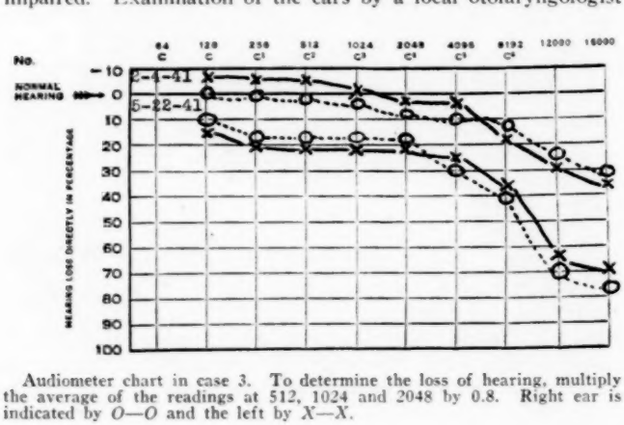
Theissing [1] in a recent publication declares that deafness due to osteomyelitis is a rare disease, only 10 cases having been reported in the literature. However, we feel that this condition is not so rare as we have been led to believe, since we have failed to associate otologic disturbances with general osteomyelitis.

The cases reported in the literature have occurred chiefly in young people. Theissing reports 1 additional case in which there was a generalized staphylococcic osteomyelitis with chief involvement of one thigh. This patient suffered attacks of vertigo, tinnitus and a loss of hearing in both ears.

We wish to present 3 cases of staphylococcic osteomyelitis (without primary involvement of the temporal bone which were complicated by tinnitus, vertigo and deafness.

REPORT OF CASES

CASE 1.—L. M., a youth aged 15, took ill on July 30, 1933 with acute osteomyelitis of the right thigh and was admitted to the Easton Hospital. Shortly after his admission to the hospital he complained of tinnitus and vertigo. On August 10, he was operated on for osteomyelitis of the right thigh. This was followed by several operations up to October 15, at which time he was discharged as improved. On October 30 the patient's family noticed that his hearing was appreciably impaired. Examination of the ears by a local otolaryngologist



Audiometer chart in case 3. To determine the loss of hearing, multiply the average of the readings at 512, 1024 and 2048 by 0.8. Right ear is indicated by *O—O* and the left by *X—X*.

was grossly negative except for a considerable hearing loss on both sides. On December 10 he had an acute flare-up of his osteomyelitic process, which necessitated his being readmitted to the Easton Hospital. While being transported to the hospital, the patient experienced considerable pain in his thigh and complained of vertigo. On arrival at the hospital he noticed that his hearing had improved, so much so that all voices seemed "painfully loud" to him. During the next thirty-five days he was operated on several times and was discharged as improved on Jan. 15, 1934. His hearing remained good until April 4, when he suddenly noticed a loss of hearing which became progressively worse over a period of four or five days. He again consulted his local otolaryngologist, who found his ears to be grossly normal but noted that his hearing was practically gone in both ears. On September 7, the patient consulted one of us. Aural examination was grossly negative and his hearing was nil when tested with the tuning forks, voice and audiometer. Neither set of vertical semicircular canals gave any response after three minutes of caloric stimulation with water at 68 F. The horizontal semicircular canals gave very poor response.

CASE 2.—Mrs. S. P., aged 30, was admitted to Temple University Hospital thirteen times between October 1931 and February 1941 for generalized staphylococcic osteomyelitis and recurrent abscesses. She gave a history of the usual childhood diseases, typhoid at 11 years and a tonsillectomy in 1926. In July 1929 an infection of the left buttock developed which was incised and drained. The patient was admitted to the Methodist Hospital, where a diagnosis of pyemia was made. While in the hospital nephrectomy was performed on the right side. Section of the kidney revealed multiple abscesses. Following this abscesses of the right elbow, both shoulders and the right instep developed. These were opened and drained and the patient convalesced and felt fairly well until the summer of 1930, at which time a right gluteal abscess was opened; a sinus has persisted up to the present time (1941). In October 1931 an abscess developed in the region of the right temperomandibular joint. The patient was admitted to the Temple University Hospital in the orthopedic service of Dr. J. R. Moore for incision and drainage. This was followed by an abscess in the left parotid region which was also incised and drained. The patient was then operated on for the sinus in the left buttock and for osteomyelitis of the right ilium. Subsequently abscesses developed in the left tibia, the left ankle and the left hip, the right knee joint, right side of the forehead, the dorsum of the right hand and in the region of the right mastoid. In October 1932 the patient complained of deafness and tinnitus in the left ear. Her ear drums were somewhat retracted but otherwise normal. Her hearing grew progressively worse and in December 1934 she complained of spells of vertigo in addition to her deafness and tinnitus. At this time she had a 52 per cent hearing loss in the left ear. Her deafness progressed so that on her last admission in February 1941 the patient was found to be stone deaf in the left ear, although she retained normal hearing in the right ear. The right vestibular apparatus gave a fairly good response after forty seconds of stimulation with water at 68 F. The left vertical semicircular canals gave a fairly good response after eighty-five seconds of caloric stimulation, while the horizontal semicircular canal gave no response.

CASE 3.—A. W., a man aged 41, was first seen by us Feb. 4, 1941 giving a history of slight impairment in hearing, tinnitus and vertigo for the past two months, accompanied by nausea, vomiting and staggering.

Gross examination revealed no spontaneous nystagmus. There was no difficulty in past pointing. Aural examination disclosed both ear drums to be normal and both eustachian tubes to be patulous. It was our impression at this time that the patient had a pseudo-Ménière's disease secondary to some focal infection. On February 11 the patient was admitted to the Graduate Hospital for observation and was discharged March 24. The family and past medical histories were insignificant except in the notation that since the age of 16 there has been recurrent osteomyelitis of the right femur. He has had twenty-four operations for this condition and, although tuberculosis was suspected, all tests were negative. He is not addicted to the use of alcohol, smokes in moderation and takes about three cups of coffee a day. About two months prior to his admission to the Graduate Hospital and without any intervening cause or infection a fairly constant fulness of the head suddenly developed. This was made worse by coughing, sneezing, lifting or suddenly changing the position of the head. Occasionally he had spots before his eyes and vertigo, and at times this was accompanied by nausea and vomiting. On less frequent occasions there was staggering, mild tinnitus and deafness. There was no history of any allergic reactions. Prior to admission to the hospital he is said to have had a moderate arterial hypertension, tonsillar tabs and infected sinuses. A few days before entering the hospital he is said to have had a flare-up of the osteomyelitis for which he was operated on February 15 by Dr. M. B. Cooperman, who found a low grade staphylococcic infection with little involvement, and the wound healed rapidly. A complete neurologic examination was first carried out February 17. This was negative except for (1) a widening of the left palpebral fissure with a slight left central facial palsy and (2) hypalgesia of the left cornea. Throughout the patient's residence on his last admission to the hospital his temperature was either normal or slightly subnormal. His pulse was usually 72, although on several occasions it dipped to as low as 60. Only rarely after the encephalogram did it go up to 100. His respirations were normal throughout his stay and his blood pressure was taken at frequent intervals and never exceeded 140 systolic and 90 diastolic. Somatic examinations failed to disclose any diseases of the chest, abdomen or extremi-

1. Theissing, Gerhard: Deafness Due to Osteomyelitis, Ztschr. Hals-, Nasen-u. Ohrenh. **45**: 284 (Sept.) 1939.

ties other than the healing condition. Detailed studies on the eyes failed to disclose any significant abnormalities. A meticulous study of the throat, the paranasal sinuses and the ears was made and revealed no evidence of any infection in those regions to account for his symptoms. The Bárány test failed to disclose any definite evidence pointing to an intracranial disorder. The blood count and blood chemistry were normal and urinalysis and the Wassermann reaction of the blood were negative. The spinal fluid pressure was 150 mm. of water and a detailed study of the spinal fluid was negative. Roentgen studies were reported as follows: February 14: "Conclusion: Bony sclerosis is noted in the shaft of the right femur, indicating an old osteomyelitis possibly associated with a localized bone destructive process about a fragment of a metal drill at the juncture of the middle and lower thirds of the shaft. No other evidence of osteomyelitis is noted at the present time. Examination of the paranasal sinuses discloses a moderate degree of left maxillary sinusitis and right sphenoiditis. Examination of the mastoid made with particular reference to the petrous pyramids is negative." February 19: "Reexamination of the petrous pyramids by means of Bucky films again demonstrates no evidence of otic pathology." "In the lateral view of the skull, the sella turcica is normal in size and configuration. The pineal gland is only slightly calcified so that it is not definitely visualized in the sagittal views; however, in these views it seems to be in the midline. The skull is otherwise negative. Conclusion: Examination of the skull is essentially negative."

It is to be noted that on February 4 hearing was normal both by air and by bone conduction. On April 26, approximately fourteen weeks after the acute onset, hearing tests disclosed a 16 per cent hearing loss in the right ear and a 14 per cent hearing loss in the left ear by air conduction. Bone conduction was diminished.

COMMENT

Theissing states that osteomyelitic deafness is caused either by an embolism or by a toxic neuritis of the eighth nerve. In case 1 there was a transient deafness. During the early stages it was probably due to a toxic neuritis but as the deafness became permanent it apparently was due to an embolism or some change in the otic capsule. In case 2 deafness was due to a toxic neuritis with a possible embolic phenomena as deafness became lateralized to one side. It is interesting to note that the loss of hearing in both cases was partial at first and later progressed rapidly to complete deafness. In both of these cases, as in Theissing's case, both the vestibular and the cochlear end organs were involved.

In case 3 one may consider the following diagnostic possibilities after due observation: brain abscess, brain tumor, chronic subdural hematoma, aneurysm and toxic headache. There is some definite physical or chemical cause to account for his headaches and associated symptoms. The existence of brain abscess, brain tumor or chronic subdural hematoma, for the time being at least, may be eliminated by the various studies, particularly the pneumoencephalogram. The existence of an aneurysm has not been ruled out and the only possible working diagnosis that we have at this time is a toxic neuritis, a mild tinnitus and a slight impairment in hearing. There is also a decided change in bone conduction. During these fourteen weeks there has been a loss in air and bone conduction with a definite drop in the high frequencies of 4,096 and 8,192. This can readily be ascribed to the osteomyelitis acting as a toxic focal factor.

CONCLUSION

1. Osteomyelitic deafness is probably not as rare as one has been led to believe. We believe that if hearing tests and otologic examinations were performed as a routine in every case of osteomyelitis the incidence of osteomyelitic deafness would be found to be more frequent than has been heretofore recognized.

2. Postmortem studies of the temporal bone would be of value.

3. Bezold's observation may lead to a clue in its relationship to other forms of deafness.

1915 Spruce Street.

Council on Physical Therapy

THE COUNCIL ON PHYSICAL THERAPY HAS AUTHORIZED PUBLICATION OF THE FOLLOWING REPORT. HOWARD A. CARTER, Secretary.

THE MANAGEMENT OF THE CEREBRAL PALSIES

WINTHROP MORGAN PHELPS, M.D.
BALTIMORE

All forms of cerebral palsy are the result of anomaly, injury or disease of the brain, a part of the body of which the functions are so diverse and so difficult to evaluate as to allow for infinite variations of the condition. The functions of the brain are localized in the fully developed person, and brain cells are specialized with a high degree of differentiation. However, there is also an integration of these functions, so that disturbance of any differentiated function results in a necessity for a total reintegration. It is impossible to imagine that any two brains would show identical localization of function. The interrelation between the fundamental inherited automatic functions and the results of the tremendously varied environmental factors could and does bring about differences in total psychomotor behavior, even in identical twins.

All response is motor response. For example, the variations of laughter are so great there are no two persons with laughs enough alike to be confused. Persons can be distinguished by their laughs as easily as by their faces. How a person laughs is to a great extent motor variation, but when he laughs is mainly psychologic. The muscles involved in laughing are not the same in different persons. There are equally definite but less clearly distinguishable variations in all motor function. The gait and the use of the arms in eating or writing are variable.

The results of cerebral palsy are different from the theoretic normal of psychomotor behavior and are of varying degrees of severity. Therefore establishment of a carefully controlled environment as early as possible is advisable to prevent further deviations of response resulting from the impaired function. The impaired function itself produces different environmental experiences and hence still further varies the motor habits and the psychologic behavior.

There is no doubt that a person having cerebral palsy is susceptible to retraining, which may be compared to training the normal person in skills, such as playing the piano. The amount of retraining possible is extremely variable and depends on the degree and the areas of damage to the brain, habit and on innate skill, as well as on the psychologic attitude of the individual patient toward his handicap. It must be remembered that in most cases the condition has existed since birth and that often, since the patient has never known a different state, he is entirely too content with his condition. However, this is not always true.

SELECTION OF CASES

Selection of cases must be made in various ways. Irrespective of the nature or the severity of the motor involvement, the parts of the body involved must be considered. From the standpoint of total motor function, the condition may involve (1) locomotion (the legs, essentially), (2) self help (the arms), (3) speech or (4) general appearance (grimaces, unusual move-

ments of the arms or legs). The aims of treatment must be clearly defined with regard to each of these four fields.

Severity of involvement is not in itself a criterion for or against treatment. One patient may represent a total handicap of motion of the arms and legs and of speech, and although the arms and legs may be so severely handicapped as to be incapable of improvement, nevertheless improvement in speech would be a tremendous asset. Another, with severely handicapped arms and legs, would lead a changed life, even if he could never be taught to walk, by improvement of the use of the arms to the extent of being able to dress, undress and feed himself, get in and out of a wheel chair and wheel it. In cases of milder involvement the problem may be merely one of personal appearance and the elimination of grimaces. The relation of a mild handicap, such as grimacing, to the ability to obtain employment is obvious.

The four fields of involvement are of widely different significance. The elimination of grimaces may convert a dependent person into an economically independent one. The establishment of an independent wheel chair life for a previously bedridden person will free him from the expense of a constant attendant. Walking in some instances is unimportant in relation to other abilities.

COMPLICATING FACTORS IN SELECTION OF CASES

Obviously, patients with definite mental deficiency should not as a rule be treated, and physical improvement in such patients would not be of much value. Naturally there are exceptions. The importance of the four fields is sometimes reversed. When defective persons grow older and become heavier, walking may be their most important attainment. Self help for eating and dressing is of value, but greater ability in the arms often is not possible because of the mental level. Absence of speech can be on a mental rather than a physical basis, as can also bizarre appearance.

Progressive types of cerebral involvement such as are seen in certain forms of encephalitis would contraindicate any but symptomatic treatment. Epilepsy, with its gradual associated deterioration, would also prevent the attainment of any lasting benefit. The vast majority of patients, however, are free from these adverse factors. It is sometimes extremely difficult to distinguish actual impairment of mentality from retardation resulting from the handicap. It is better to give all patients the benefit of the doubt and attempt treatment until it is proved impossible than to decide a priori on the basis of a mental test. The Stanford-Binet examination may give a low intelligence quotient, and, if so, it must be determined subsequently why the quotient is low. It is unwise in general to modify the test, since this will introduce variables which will destroy its accuracy. All response is motor response, and the tests are always affected by motor impairment; psychologists are seldom sufficiently acquainted with motor impairment to balance out the factors responsible for the inaccurate results.

CLASSIFICATION TO DETERMINE METHODS OF TREATMENT

The scope of cerebral palsy includes all the variations of normal coordinated voluntary muscular contraction.

Flaccid paralysis, it is now known, can occasionally result from causes referable to the brain as well as to the spine or to the lower motor neurons. Flaccidity or complete lack of muscular response to stimulation is easily understood. The exact opposite is rigidity (muscular), or a constant state of contraction. This is not frequently seen but must be distinguished (for purposes of treatment) from spasticity, with which it is often confused. The truly spastic muscle is not rigid but is simply hyperirritable and hypercontractile when stimulated. Thus spasticity is present only when the muscle is stimulated. It is an abnormality of response and not a constant condition. The most common stimulus a muscle receives, aside from voluntary stimulation by its nerve, is the stretch it undergoes when its antagonist is voluntarily contracted and motion is produced in the joint in the opposite direction. When this occurs in the normal person, the muscle relaxes, according to the reciprocal innervation theory of Sherrington, or at least it remains idle. The spastic muscle, however, neither relaxes nor remains idle but contracts and more or less effectively blocks the attempted motion. That this is a reflex is obvious, since the same phenomenon occurs as a result of passive as well as of active motion. The most accurate method of determining the presence of true spasticity is by testing for the reflex contraction resulting from stretching. The knee jerk is hyperactive in spasticity but may falsely appear hyperactive in other conditions to be described and hence is not a reliable criterion.

Another abnormality of motor function is involuntary motion. This may not always be neurogenic, since there is reason to believe that in some conditions (the true dystonias) it has its origin in the muscle itself. However, it is usually a manifestation of cerebral disturbance. Involuntary motion differs from spasticity, since it is not the result of attempts to move. The force of contraction and the resultant amplitude of motion are determined by the degree of tension. This, in turn, is the result of emotional states, such as fear, in which it is definitely increased. In sleep it almost disappears.

Involuntary motion may be seen in several forms. The nonintention tremor is a regular reciprocation between antagonists or between one muscle and gravity as an antagonist. Athetosis is the least understood but most common type of involuntary motion. Recent studies have shown that it is independent of any individual muscle but represents rather an irregularly repeated movement of the total joint. Thus an involuntary motion, or athetosis, of wrist flexion will persist with the flexors of the fingers, even after the flexors of the wrist have been cut, when it had previously been shown that the impulse to flex was definitely in the wrist flexors. That this is true has been proved repeatedly and is of great importance in relation to surgical intervention in the treatment of athetosis.

Athetosis is usually but not always accompanied by definite tension, which, although it appears to be of voluntary origin, has become habitual and apparently develops in an attempt to block the athetosis. The tension has persisted so long that it is impossible for the patient to release it except under careful and often prolonged training. It is sometimes confusing, since it may produce a scissors position of the legs and other distortions of motion suggesting spasticity. In fact, the reflexes may often be hyperactive, inconsistently, however. The response is due to automatic reinforcement by strong athetoid contractions or by tension elsewhere in the body. This effect is analogous to the reinforcement test commonly used to emphasize sluggish responses. A careful motor examination is necessary to distinguish tension athetosis from spasticity, and the distinction is important, since methods of treatment of the two conditions differ widely.

Still another motor deviation is primary incoordination or ataxia. Naturally, incoordination will result from almost any motor disturbance, but it is then a secondary condition. Primary incoordination is a disturbance of the proper innervation or control of force or selectivity of muscular contraction. In this condition, as in spasticity, the motor system is normal when not stimulated. Furthermore, the muscles seem normal to passive tests. It is only when motion is willed that the direction and force of the movements are uncontrolled.

Ataxia constitutes the most prevalent form of primary incoordination, and the fundamental difficulty is a disturbance of the balance mechanism and the postural sense. The condition represents the third large division of cerebral palsy, and while statistically there are fewer cases of ataxia than there are of either spasticity or athetosis it is a fairly common form and is relatively easy to distinguish.

METHODS OF TREATMENT

By far the most important therapeutic agents now known to be effective for the cerebral palsies are motor reeducation and relaxation. Surgical intervention and medication are at present adjuncts and aids to treatment. Because repair, except by scar tissue, of damaged nerve tissue, especially in the brain, is slow or absent, restoration of function cannot take place. The improvement attained, therefore, is probably due to substitution, that is, training of uninjured parts of the brain to take over the function of the injured or destroyed areas. This is a highly theoretical assertion. When the normal person is taught unusual types of skills, such as playing the piano or tightrope walking, he trains various coordinated mechanisms involving unusual reciprocal control and balance, which he gradually improves and perfects. Eventually they become automatic, so that the technic of performance is no longer a detailed conscious act. It can be shown that in the same way the usually instinctive automatic acts, such as the reciprocal action of the legs in walking, can be taught to a patient who through injury to the brain at birth has never acquired it. Just what takes place in the brain under these circumstances is not known.

The chief fundamental motions, which may be instinctive, or at least learned early in babyhood, are reciprocal kicking (a fundamental to walking), reaching and grasping (a fundamental to self help with the arms) and vocalized breathing (crying, fundamental to speech). If any of these are interfered with by abnormalities of the neuromotor system, the more complicated activities dependent on them will not be developed. After they have been taught, however, further activities may progress.

It is possible that some form of medication may be found which will restore these automatic functions when they have been learned and are later masked, as in cases of encephalitis or other conditions acquired after babyhood, but it is obvious that if they have never been developed or learned there can be no short cut. Motor training in reciprocation, reaching and grasping, and vocalization, as examples, must therefore be depended on in all cases when these have been shown to be undeveloped.

Relaxation is a second motor ability which must be taught. This is important mainly in cases of athetosis and other forms of involuntary motion. It is continued by teaching motion from the relaxed position. In spasticity and ataxia, on the other hand, relaxation itself is not as important as motion from the relaxed position, since in these conditions nothing goes wrong until motion starts. In athetosis, the force and amplitude of the motions will be greatly decreased by intensive voluntary relaxation, because they are abolished during sleep and increased during excitement. In tension-athetosis, relaxation is especially necessary to eliminate the habitual tension, developed, as has been explained, in the vain hope that it will stop the involuntary motions. When relaxation has been sufficiently learned, which may take months or even years, then motion from the relaxed position may follow, but it may be started relatively early in cases of spasticity. It consists of training in the maintenance of relaxation of all parts of the body not essential to the specific motion undertaken.

There are many ways of producing relaxation, such as the use of antispasmodics, sedatives, alcohol and hot baths, but all have little value, since they are not voluntary and are transient in their effects. Unquestionably, the person with athetosis can do more while under their influence, and they serve occasionally as useful aids in teaching true voluntary relaxation. However, after the effect of the drug wears off a swing to greater tension usually occurs because of the lack of the relaxing effect. Motion from the relaxed position can be well demonstrated by the use of drugs but does not help much in training, because greater effort, rather than less, must be put into the muscles to be contracted, owing to their relaxed condition. For the spastic patient, use of antispasmodics may well have a place in the reduction of the stretch reflex, but it would be necessary to maintain administration of the drug in order to maintain its effect. At present, because of toxic effects, this would not be practicable. Intensive training in reciprocation while the patient is under the influence of the drug might bring about some carry-over, provided it could be used regularly. This point can be determined only by a longer period of study and a greater volume of material.

Obviously, neither relaxation nor motion from the relaxed position is of any value for patients with ataxia, since they do not exhibit tension, spasticity or involuntary motion. For them the emphasis is on training in balance and coordination. Balance can be improved greatly by teaching the patient an awareness of small deviations of balance. At first this must be a definitely conscious activity, but by practice it gradually becomes automatic. It represents another example of substitution, the development of a skilled conscious act to replace a normally automatic one.

Reeducation in motor fundamentals, relaxation, motion from the relaxed position and training in balance are, therefore, the physical measures essential to the amelioration of the various types of cerebral palsy. The technics by which they are taught are in the provinces of physical education and physical and occupational therapy.

For persons showing spasticity a careful examination of the muscles, with muscle charts such as are used for poliomyelitis, is necessary. The treatment of weak or flaccid muscles by protection and rest, with carefully graded exercise, must be carefully undertaken. The prevention of unwanted stretch reflexes must be considered in connection with all apparatus and activities. All exercises must bring into play only the desired muscles.

To patients showing athetoid movements, training in coordination and balance as well as in individual

motions alone must be given, since they lack this practice. A chart of the athetoid movements, rather than of muscles, is used as a guide to therapy. In the treatment of all the types, familiarity on the part of the technicians with the various methods of relaxation therapy and training in balance is essential.

SURGICAL INTERVENTION

Except for true contractures, surgical measures have their chief place only in the treatment of spasticity. Since athetosis appears to be independent of individual muscles and since forceful prevention of athetoid motions seems only to intensify the involuntary motion, surgical intervention does not help. As has been stated, athetosis is characterized by an attempt on the part of the body to assume a given position. This attempt is not constant but irregularly intermittent. An example is a case in which the foot was pulled into a varus and in-toeing position by an athetosis of the tibial muscles. A tarsal stabilization was performed, after which an inward rotation (intermittent) of the whole leg from the hip began to develop to bring the foot again into the in-toeing position. Before the operation, the external rotators of the hip had been the more active. Thus, even bony fixations will usually bring about only a shift in the athetosis to other muscles and even other parts of the body. For persons with ataxia there is no particular indication for any operation known at present.

In cases of spasticity, however, good results can be accomplished, but the operation must be undertaken only if it can be followed by efficient postoperative reeducation. The procedures to be carried out must be dependent on the examination of the muscles. Toe walking, so commonly seen with spasticity, may result from a variety of imbalances involving the heel cord muscles and their antagonists, the dorsiflexors. Toe walking is not always the result of spasticity of the heel cord muscles. The possibilities in any case of spasticity are as follows: [1]

1. Spastic heel cord muscles vs. spastic dorsiflexors.
2. Spastic heel cord muscles vs. normal dorsiflexors.
3. Spastic heel cord muscles vs. flaccid dorsiflexors.
4. Normal heel cord muscles vs. flaccid dorsiflexors.
5. Flaccid heel cord muscles vs. flaccid dorsiflexors.

The first example will result in toe walking of slight degree only because of the greater strength of the heel cord muscles, the result being due to the constant stretch reflexes produced by walking. The second example will cause more pronounced toe walking, while the third will result in an extreme degree. The fourth will also cause rather pronounced toe walking and will result in a contracture such as is seen in poliomyelitis. The fifth will result in a simple contracture due to gravity.

It is obviously true that the operation advisable would vary with each of the aforementioned imbalances. The recommendations would be as follows:

1. No open surgical intervention, since lengthening the heel cord or even partial neurectomy would result in heel walking and fixed pes calcaneus. Stretching, with the patient under anesthesia, and the maintenance of position by a brace until growth has been attained will give the best results.

2. Partial neurectomy and partial lengthening of the heel cord. The nerves to be partially excised are those to the gastrocnemius or to the soleus muscle, whichever proves the more spastic. This can be determined by testing for a stretch reflex with the knee flexed (soleus muscle) or with the knee extended (gastrocnemius muscle). In the lengthening of the heel cord, the muscle must not be made too long, because of the normal dorsiflexors.

3. Nearly complete neurectomy and free lengthening of the heel cord, since the dorsiflexors are flaccid.

4. No neurectomy but only lengthening of the heel cord and perhaps stabilization.

5. Stabilization of all joints or midtarsal stabilization and posterior bone block.

It can be seen that the same set of possibilities may be present in any pair of antagonists throughout the body of the spastic patient, and the general reasoning brought out in the foregoing example can be followed. This must be carefully worked out in regard to the hip adductors and internal rotators, which are so easily confused in their action in many persons with spasticity.

GENERAL TREATMENT OF THE PATIENT

The treatment so far described represents a résumé of the care of the motor handicap, which is often the most obvious difficulty in cerebral palsy. The condition, however, involves many other variations from normal which are not easy to determine accurately first because their localization in the brain is not known and second because the modifications of the motor functions due to the effects of environment and habit on an abnormal motor response cannot be measured. These variations are chiefly in the fields of education and behavior. The modifications imposed on educational programs by a severe motor speech defect are definite; and behavior, because of the necessity for speech substitutes, is obviously unusual. The erroneous interpretation of such behavior as mental deficiency is easy. Retardation due to the handicap is to be carefully distinguished from true impairment of the mental faculties. It is impossible, for example, to determine the limitations in experience which are produced by inability to walk before the age of 6. The child who learns to walk at the age of 16 months has, by the age of 6, come in contact with innumerable articles and has coordinated his knowledge of them, by handling them, with the varying auditory and visual impressions resulting from moving around. Just how much the child who remains in one chair loses in experience is not measurable, but there must be a great difference, which would interfere with normal learning. Similar variations, but of a different variety, result from handicapped use of the arms.

SENSORY HANDICAPS

Impairments of the sensory apparatus are frequent but easily overlooked components of cerebral palsy. Ocular tests may show normal vision, but loss of control of the extraocular muscles, involved in either spasticity or athetosis, may seriously interfere with reading. With the ataxias, nystagmus is common, and this also may be a handicap to reading.

Hearing defects are common, especially with athetosis. These are usually selective impairment for certain ranges of pitch, with normal hearing in other ranges. Thus the ticking of a watch might be heard at a normal distance, but there might be a complete loss at the same time in the higher frequencies, with inability to hear consonants, especially "s," "f" and "th," and the vowel "e" sounds. The speech of others would be partially unintelligible to the patient, and his own speech, since he spoke as he heard, would be equally unintelligible to the listener. This situation may occur alone or be coupled with some athetosis of the tongue, resulting in a double handicap. The elements of such a speech

1. The combinations not listed would not result in toe walking.

defect must be identified and separated so that each part of the difficulty may be treated rationally.

Some spastic patients, notably those with hemiplegia, have a sensory loss in the spastic arm. Motor retraining may be so successful as to bring about practically normal function in all the joints, but still the child will not use the arm. This may be partly due to habit, but loss of sensation, especially for fine differentiation, should be carefully studied, and when it is present, careful eye to hand coordination must be relied on for developing satisfactory use. Care must be observed not to overtrain the bad arm at the expense of the normal one, since stuttering has been seen to develop under these circumstances. All exercises given to the bad arm should be duplicated with the normal one, to keep it ahead and continue its leading role.

Educational methods must take into consideration these sensory difficulties, and teaching methods used for all types of handicaps must be combined in various proportions.

ATTAINMENT OF SKILLS

In training patients with cerebral palsy, the normal activities—walking, eating, dressing and speaking—are the ends to be attained primarily. These are the equivalent of the special skills for which the normal person requires teaching. The progress to higher skills follows directly on the attainment of normal activities. Writing, as a skill, may prove difficult in a given instance. If typing proves simpler because of the particular mechanical difficulty, the emphasis should be placed on learning to write a signature only, since this is essential, and the rest of the training should be in typing.

MEASUREMENT OF RESULTS

The results attained in the motor training of patients with cerebral palsy are best measured in functional attainments. Improvement in walking is measured by (1) endurance, i. e. how many steps or how far the child can walk without falling or tiring; (2) speed, i. e. the length of time it takes him to cover a given distance, and (3) appearance of the gait. The last and actually less important factor is not as susceptible to actual measurement. Moving pictures are of some help but have not proved as valuable as they might seem, since there is so great a daily variation in the abilities of the patients.

Improvement in the various fields of use of the arms can be measured in much the same way. 1. Speed of use, i. e. how long it takes the child to write a given number of words, to dress or to eat a certain amount of food. This may have to be broken down into simpler, less total activities in cases of severe involvement and early in treatment. 2. Appearance of use of the arms, e. g. how accurately and smoothly the patient can button a garment or hold a pencil.

In the field of speech the measurements are again in (1) speed, (2) clarity (in relation to speed) and (3) appearance, e. g. absence of grimaces. Accurate charts of these functions should be kept with regard to both time and distances and will be found the best indications of results.

COMMENT

This discussion has been limited to certain phases of the problem of cerebral palsy. It has not included statistical data, etiology, neurologic material (either medical or surgical) or details of treatment methods and apparatus. It has been devoted entirely to the general management of the problem, chiefly from the motor reeducational, surgical and medical points of view.

3038 St. Paul Street.

THE COUNCIL ON PHYSICAL THERAPY HAS AUTHORIZED PUBLICATION OF THE FOLLOWING CORRECTION. HOWARD A. CARTER, Secretary.

CORRECTION: SPERTI IRRADIATION LAMP, MODEL HI-41, ACCEPTABLE

Manufacturer: Sperti Electric Manufacturing Corporation, Beech and Kenilworth avenues, Cincinnati.

The Council report on the Sperti Irradiation Lamp, Model HI-41, which appeared in THE JOURNAL, July 5, 1941, contained an error in the tabulated data dealing with the radiation characteristics. Following are the correct radiation measurements for the Sperti Irradiation Lamp, Model HI-41:

Operated at 117 volts. Measurements at 24 inches from center of tube, on axis of reflector.

Spectral Region	Microwatts per Square Centimeter
Total radiation	34,800
Radiation beyond 14,000 angstroms	31,200
Radiation between 5,790 and 14,000 angstroms	950
Radiation between 4,000 and 5,790 angstroms	1,670
Radiation between 3,130 and 4,000 angstroms (including 3,132)	885
Radiation between 2,800 and 3,130 angstroms	125
No measurable radiation below 2,800 angstroms	

Radiation in ultraviolet lines.

Wavelength	Microwatts per Square Centimeter
2,893	17
3,022	101
3,132	262
3,342	49
3,650, 54, 63	574
4,047	264
4,358	413

Council on Pharmacy and Chemistry

REPORTS OF THE COUNCIL

THE COUNCIL HAS AUTHORIZED PUBLICATION OF THE FOLLOWING STATEMENT. THEODORE G. KLUMPP, M.D., Secretary.

DESIGNATIONS "STILBESTROL" AND "DIETHYLSTILBESTROL" FOR THE SYNTHETIC ESTROGEN 4:4'-DIHYDROXYSTILBENE AND ITS DIETHYL DERIVATIVE

In their report on the estrogenic activity of certain synthetic compounds (*Nature*, Feb. 5, 1938) Dodds, Goldberg, Lawson and Robinson propose the name stilbestrol for the compound 4:4'-dihydroxystilbene, which they refer to as the mother substance of a series of estrogenic agents. In this report the authors employ the designation diethylstilbestrol for the diethyl derivative of the mother substance just mentioned. In a later report by Dodds, Lawson and Noble, "Biological Effects of the Synthetic Oestrogenic Substance 4:4'-dihydroxy alpha:beta-diethylstilbene" (*Lancet*, June 18, 1938), the name diethylstilbestrol is used exclusively for the diethyl compound. In later publications, however, Dodds and his associates used the term stilbestrol synonymously with diethylstilbestrol as a concession to the general use of the term stilbestrol for 4:4'-dihydroxydiethylstilbene which had developed (E. C. Dodds, "Stilbestrol," *Practitioner*, March 1939 and "The New Endocrinology," *Lancet*, Oct. 7, 1939).

To promote the use of accurate nomenclature and with the hope of avoiding confusion in the future should other derivatives of the mother substance come into use, the Council recognized the name stilbestrol (pronounced stĭlb-ĕst-rŏl) as the common, nonproprietary designation for 4:4'-dihydroxystilbene, and the name diethylstilbestrol (pronounced dī-ĕthŷl-stĭlb-ĕst-rŏl) as the common nonproprietary designation for the diethyl derivative, 4:4'-dihydroxy alpha:beta-diethylstilbene, and authorized publication of the foregoing statement. It should be noted that the parent substance, stilbestrol, has relatively slight estrogenic activity. The substance called stilbestrol in a number of recent reports in the American and English literature would be more appropriately referred to as diethylstilbestrol.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

535 NORTH DEARBORN STREET - - - CHICAGO, ILL.

Cable Address - - - - "Medic, Chicago"

Subscription price - - - - - Eight dollars per annum in advance

Please send in promptly notice of change of address, giving both old and new; always state whether the change is temporary or permanent. Such notice should mention all journals received from this office. Important information regarding contributions will be found on second advertising page following reading matter.

SATURDAY, NOVEMBER 8, 1941

PROCUREMENT AND ASSIGNMENT SERVICE FOR PHYSICIANS, DENTISTS AND VETERINARIANS

One of the most significant actions taken by the House of Delegates at the annual session of the American Medical Association held in Cleveland in June was its approval of a resolution introduced by the Committee on Medical Preparedness urging that the United States government establish an agency for the procurement and assignment of physicians to meet the many needs arising out of the emergency in which the nation finds itself. On Friday October 31 the President of the United States approved an order establishing a Procurement and Assignment Service for Physicians, Dentists and Veterinarians as a part of the Office of Defense, Health and Welfare Services under the direction of Mr. Paul V. McNutt to stimulate voluntary enrolment of these professions. The resolution of the House of Delegates also urged that this agency be under the direction of representatives of the civilian medical profession. The President has appointed as a board to administer the new service the following members: Chairman, Dr. Frank H. Lahey, President of the American Medical Association; Dr. Harold S. Diehl, dean of the medical school of the University of Minnesota and a member of the Education Committee of the Health and Medical Committee; Dr. James E. Paullin, who is retiring president of the American College of Physicians and chairman of the Council on Scientific Assembly of the American Medical Association and also a member of the Committee on Medical Preparedness; Dr. Harvey B. Stone, a member of the House of Delegates of the American Medical Association, of the Committee on Medical Preparedness and of the Council on Medical Education and Hospitals, and Dr. Caleb Willard Camalier Jr., Washington, D. C., a past president of the American Dental Association and a member of its Committee on Medical Preparedness.

The functions of the agency now established include primarily the procurement of personnel from existing qualified members of the professions concerned. It is proposed that various governmental and other agencies requiring professional personnel for needs related to the emergency shall send their requests to the Procurement and Assignment Service indicating the number of men desired, the time during which they must be secured, and the qualifications and limitations placed on such personnel. The Service may then by appropriate mechanism arrange to secure lists of professional personnel available to meet these requirements, utilizing existing rosters such as the one now available in the headquarters of the American Medical Association and of the American Dental Association, or other public and private rosters which it may consider acceptable. The agency is also authorized to approach such professional personnel as are considered to be available and to use suitable means to stimulate voluntary enrolment. Emphasis should be placed on the fact that voluntary enrolment is desired and that modern means of procurement will be utilized. Already the states and many of the counties of the United States have been organized for military medical preparedness through the Committee on Medical Preparedness of the American Medical Association. Thus it becomes possible to determine availability of various physicians and their qualifications for special services. Obviously it is possible also in this way to protect the civilian needs of American communities.

In its work the Procurement and Assignment Service is authorized to procure an executive secretary who shall serve as executive officer and who is to be a full time appointee with a salary. The members of the board which administers the agency are to serve, as does the Health and Medical Committee, whose organization it parallels, without salary. The board is authorized to secure such necessary assistants as may be required, to establish advisory committees and subcommittees representing the various interests which may be concerned, to develop suitable liaison with governmental and private agencies, to establish suboffices if they are required, and indeed to do almost everything, short of compulsion, that may be useful in supplying the Army, the Navy, the Public Health Service, essential industries and the civilian population with necessary professional personnel.

Under the heading of Medical Preparedness in this issue of THE JOURNAL appears an analysis of the present situation as regards the supply of physicians in the present emergency. Recently THE JOURNAL called attention to the problem created by failure of junior and senior medical students and of interns to avail themselves of the opportunities offered by the Army and Navy medical departments to become enrolled in official agencies which would make them available when called as commissioned medical officers. No doubt the new Procurement and Assignment Service will give

special consideration to this phase of the problem. From the reservoir of young physicians coming into the practice of medicine must be obtained the majority of those needed for replacement of physicians now in service as members of the reserve corps. Should there be a sudden large expansion of our army, the number of physicians needed might approach ten thousand or more. The securing of these men could be brought about without jeopardizing the health of the nation by utilizing the complete cooperation of the medical profession.

SWINE POX AND VACCINIA

Evidence that at least two biologically distinct viruses are involved in the disease currently diagnosed as swine pox is reported by Shope [1] of the Rockefeller Institute in Princeton, N. J. For at least sixty years the relation between the various pocklike conditions of man and domestic animals has been controversial. The majority opinion about twenty years ago was summarized by Gins [2] of the Robert Koch Institute, Berlin. He found that human smallpox could be adapted to cows, sheep, goats and swine by "lapinization" (serial passage in rabbits), from which he concluded that all pocklike diseases are of common microbic origin. A few veterinarians [3] of that time disputed this opinion. They reported, for example, absence of cross immunity between natural swine pox infection and experimental inoculation with vaccinia virus.

Swine pox, prevalent in the United States, is encountered with particular frequency in the Middle Western states. The disease is usually mild and unaccompanied by fatalities, though occasional herd mortalities of from 5 to 30 per cent have been reported. A 2 to 5 per cent aqueous extract of pustular material will reproduce the disease if applied to slightly scarified skin surfaces of normal swine. The incubation period is usually from five to seven days, with papulopustular lesions persisting for six to eight days, after which the lesions become superficially scabbed. Secondary lesions do not occur in louse-free hogs, but numerous secondary pustules may appear in swine infected with lice, especially in the inguinal and axillary regions. Shope found that swine free from lice will not transmit the disease by contact even if confined to the same pen, but contact infection regularly occurs with louse-infected swine after twelve to eighteen days. Lice apparently act merely as mechanized carriers. One attack of swine pox renders hogs solidly resistant to reinfection. The serum of these immune hogs, however, rarely shows demonstrable virus-neutralizing antibodies.

Swine are also naturally susceptible to vaccinia virus [4] and respond to this virus with vesicular reactions, which usually are slightly more superficial and slightly more rapid in development than in control inoculation with native swine pox virus. Vaccinia-convalescent hogs are immune to homologous reinfection, and their serums will neutralize homologous virus. Shope found that vaccinia convalescent serum is without demonstrable virucidal effects on native swine pox virus. The antigenic differences suggested by this observation were confirmed by cross inoculation tests. Two groups of hogs were infected experimentally, one with vaccinia virus, the other with native swine pox virus. After complete recovery, each animal was reinoculated simultaneously with the two viruses. Hogs recovered from vaccinia developed typical lesions to native swine pox virus, after the regular incubation period, but failed to develop vaccinia lesions. Conversely, swine convalescent from native swine pox developed typical vaccinia lesions but were refractory to native swine pox. Thus native swine pox and vaccinia virus are biologically unrelated.

The conclusion as to lack of relationship agrees with the minority opinion of earlier investigators but is contrary to the majority opinion. The discrepancy would find a plausible explanation if one was to assume that vaccinia virus at times causes a natural infection in swine. If so, at least two etiologically distinct conditions are currently diagnosed as swine pox, one due to vaccinia virus and the other to the true swine pox virus. From the practical point of view this difference is of little interest, since the control of swine pox would seem to depend largely on adequate control of lice. Whether or not the native American swine pox virus is also infectious for man was not tested in the Princeton laboratory.

1. Shope, R. E.: Arch. f. ges. Virusforsch. **1**: 457, 1940.
2. Gins, H. A.: Ztschr. f. Hyg. u. Infektionskr. **89**: 271, 1919.
3. Velu; Rec. méd. vét. **92**: 24, 28, 1916. Zahala, J.; Maggio, C., and Rosenbusch, F.: Viruela de los cerdos, Buenos Aires, 1917.
4. Nelson, J. B.: J. Exper. Med. **56**: 835 (Dec.) 1932.

TRANSFUSION OF BLOOD AND OF BLOOD SUBSTITUTES

Attempts at blood transfusion during the eighteenth and nineteenth centuries were limited to the use of blood from animals and of defibrinated blood. The operation of blood transfusion does not present great difficulties except for the tendency of the blood to clot. In 1901 Landsteiner discovered the laws of isohemoagglutination and isohemolysis of blood; then Jansky, in 1907, established the existence of four distinct blood groups and their compatibilities. The gravest danger of blood transfusion was thus overcome. The next problem was a purely technical one. Methods of blood vessel anastomosis were developed by Carrel and Crile and made possible direct artery to vein transfusion. The direct method required surgical skill and finesse possessed by few. The method was soon displaced by an indirect method of transfusion in which blood from the donor was collected in a vessel coated with a layer of paraffin. Hustin [1] of Belgium proposed in 1914 a

1. Hustin, M.: Principe d'une nouvelle methode de transfusion muqueuse, J. méd. de Bruxelles, 1914, number 32, p. 436.

method of collecting blood in a vessel containing an equal amount of a solution of 5 per cent dextrose in 9 per cent of sodium chloride and sodium citrate in the amount of 20 cc. for each hundred cubic centimeters of blood. The method was used on a rather large scale by the Entente forces during World War I.

Rous and Turner [2] demonstrated in 1916 that human red cells can be kept alive for four weeks in a mixture of 3 volumes of blood, 2 volumes of 3.8 per cent sodium citrate in water and 5 volumes of 5.4 per cent dextrose. These basic experiments established the feasibility of preserving blood and pointed the way to the development of blood banks. Preservation of blood was studied intensively in Russia. The Moscow Institute for Hematology developed a formula for a diluent solution which included sodium citrate 5 Gm., sodium chloride 7 Gm., postassium chloride 0.2 Gm., magnesium sulfate 0.004 Gm. and distilled water 1,000 cc. Researches by DeGowin, Harris and Plass [3] showed that this formula was not more effective in preventing hemolysis than the dextrose-citrate diluent of Rous and Turner. Use of placental blood for massive transfusions was reported from the Oncological Institute of Moscow.[4] Yudin,[5] impressed by Shamov's experiments on dogs, began to practice transfusion of blood from cadavers in his clinic at the Sklyfavosky emergency hospital in Moscow. Here the first blood bank was established. Mass application of preserved blood for transfusion was first practiced in Spain during the recent civil war. The Barcelona blood transfusion service, which functioned from August 1936 to January 1939, had obtained 9,000 liters of blood from 28,900 donors. The first blood bank in the United States was apparently that established by Fantus at the Cook County Hospital of Chicago in 1937.

Stored blood, however, was not the final solution of the problem. Progressive hemolysis, which takes place in all stored blood, places a definite limit on its usability. Blood serum and blood plasma have been studied now for some time as possible substitutes for whole blood.

As early as 1901 Brodie pointed out that intravenous injection of blood from serum in experimental animals produced reactions which did not occur when similar quantities of sodium citrate plasma were used. Rossius and later Kallius demonstrated in animal experiments that the effect of blood transfusion in hemorrhage is due not to the oxygen carriers but to the fact that the transfused fluid remains longer within the blood vessels than any other blood substitute. Transfusion of plasma was found to be as effective as the transfusion of whole blood. Filatov and Kartasevsky [6] reported on the hemostatic effect of blood plasma transfusion in 72 cases. The blood of the donor was received in a flask half filled with a saline-citrate preservative. The mixture was kept from three to four days in the ice box, and the supernatant plasma was siphoned off and placed in sterile flasks having a capacity of from 50 to 250 cc. These authors found the hemostatic effect of plasma equal to that of whole blood. The plasma may be preserved for months, though the exact limit has not been determined. Plasma from groups A and B may be given any patient without determining his blood group because it does not contain agglutinins. Levinson and Cronheim [7] demonstrated in animal experiments that the agglutinin neutralizing property of serum is aided by a like property of all the body cells and that this provides a wide margin of safety in protecting the recipient's red cells from the infused agglutinins. Scudder [8] believes that plasma approaches the ideal physiologic perfusion fluid and is superior to acacia, dextrose, salt and serum. Strumia, Wagner and Monaghan [9] point out that plasma can be readily prepared and safely transported, can be stored for an indefinite period, is entirely safe and free from reactions, can be used in large and repeated doses, is ready for instant use and does not add to concentration of erythroctyes if this condition is present. They also emphasize that it is not necessary to type the citrated plasma.

Elliott and his associates have also done much pioneer work on blood plasma transfusion in the United States. As early as 1936 Elliott [10] reported a new method of transfusion utilizing a vacuum tube with the aid of which storage of plasma was made possible. Tatum, Elliott and Nesset [11] suggest that plasma should be an ideal substitute for whole blood in emergency treatment of shock and hemorrhage from war wounds; it can be prepared where the source of blood is practically inexhaustible and preserved for long periods if necessary before being shipped to the point where it is needed. Transportation will not affect plasma. Laboratory facilities are not required, since typing and cross agglutinating will not be necessary. Flosdorf and Mudd have evolved a method for drying plasma in which the plasma is frozen in solid carbon dioxide and is evaporated under a high vacuum. Edwards, Kay and Davie [12]

2. Rous, Peyton, and Turner, J. R.: The Preservation of Living Red Blood Cells in Vitro, I and II, J. Exper. Med. **23**: 219-239 (Feb.) 1916.

3. DeGowin, E. L.; Harris, J. E., and Plass, E. D.: Studies on Preserved Human Blood, J. A. M. A. **114**: 850 (March 9) 1940.

4. Bruskin, Ya. M., and Farberova, R. S.: Use of Umbilical and Placental Blood for Massive Transfusion in Surgery, Sovet. vrach. zhur. **40**: 1546 (Oct. 30) 1936; abstr. J. A. M. A. **107**: 2098 (Dec. 19) 1936.

5. Yudin, S. S.: Transfusion of Cadaver Blood, J. A. M. A. **106**: 997 (March 21) 1936.

6. Filatov, A., and Kartasevsky, N.: Transfusion of Human Blood Serum for Control of Bleeding, Zentralbl. f. Chir. **62**: 441 (Feb. 23) 1935; abstr. J. A. M. A. **104**: 1461 (April 20) 1935.

7. Levinson, Sidney O., and Cronheim, Anny: Suppression of Isoagglutinins and the Significance of the Phenomenon in Serum Transfusions, J. A. M. A. **114**: 2097 (May 25) 1940.

8. Scudder, John: Studies in Blood Preservation, Ann. Surg. **112**: 502 (Oct.) 1940.

9. Strumia, M. M.; Wagner, J. A., and Monaghan, J. F.: The Use of Citrated Plasma in the Treatment of Secondary Shock, J. A. M. A. **114**: 1337 (April 6) 1940.

10. Elliott, John: Blood Plasma, South. Med. & Surg. **103**: 252 (May) 1941.

11. Tatum, W. L.; Elliott, J., and Nesset, N.: A Technic for the Preparation of a Substitute for Whole Blood Adaptable for Use During War Conditions, Mil. Surgeon **85**: 481 (Dec.) 1939.

12. Edwards, F. R.; Kay, James, and Davie, T. B.: The Preparation and Use of Dried Plasma for Transfusion, Brit. M. J. **1**: 378 (March 9) 1940.

describe a cheaper method of preparation of dried plasma by means of vacuum drying. One thousand cc. of plasma gives 8 cc. of dried product. Dried plasma can be reconstituted by solution in distilled water and filtering. The dried plasma promises to be the eventual solution of the problem for war emergency because of the greater stability, smaller bulk and the relative simplicity of packing, storing and transporting.

Current Comment

THE CIVILIAN PHYSICIAN BECOMES AN ARMY OFFICER

A brief comment in the *Lancet* for September 13, in a section in which peripatetic correspondents express their views, calls attention to the great differences that exist between medical practice in civilian life and the type of practice sometimes required in the army. It serves also to emphasize the extent to which modern medical education fails to teach the kind of medical practice that can be used by a general practitioner in many of the circumstances in which he finds himself. The views were prompted by a series of lectures given by army officers and officials to a group composed of consultants, public health officials and a battalion of medical officers.

> The hospital officer instructed the hospital staffs to fill in the forms promptly and with due attention; the R. A. M. C. explained to the consultants the inner meaning of the Army's funny little ways; the consulting physicians and a professor of medicine told the regimental medical officers that they must exercise more judiciously their diagnostic powers.

Apparently it was the desire of those who spoke that diagnoses of pulmonary tuberculosis, gastric ulcer and conditions of the heart be made without the use of much of the apparatus and laboratory investigation that accompany such diagnoses in civil life. The point of the description is in a fancied reply made by the writer to the professor of medicine. This reply says, in part:

> These Army doctors were the family doctors of yesterday and the medical students of the day before. Some of them may have been Professor X's students. Can it have been that their medical education was faulty? Is it possible that they were taught to regard medicine in the professorial units as an applied science and not as a practical art? Certainly they were taught that the proper investigation of a chronic cough made necessary a radiogram and a sputum investigation; that no chronic dyspepsia could be correctly assessed without chemical and radiological evidence; that cardiac neurosis was established as a diagnosis when electrocardiograms were negative. In short, that neurosis was a negative diagnosis and not to be positively established. Which of us was told by the professors that it was better to miss one case of active tuberculosis or cancer than to confirm five neurotics in their neurosis? When did a professor of medicine come to his conclusions quickly? These R. M. O.'s too were family doctors yesterday. Today they are told by consulting physicians that they send their patients too readily to hospital for investigation. This is apparently true today and it was equally true yesterday; and yet no one has heard a consulting physician tell his family doctor clients that it would be better for their patients if they did not refer them for a second opinion and that some patients are made worse and not better by investigation. The experienced family doctor knows this; the consulting physician knows it too, but it would require a supernatural disinterestedness in him to preach the good news. Moreover, most family doctors serve in the national health insurance system which denies them the opportunity to investigate their patients at all deeply; so that reference to hospital with consequent loss of clinical experience or treatment of his patient without diagnostic certitude is the panel doctor's daily dilemma. To learn in what circumstances radiology and pathology may safely be discarded in diagnosis requires a clinical experience which can only be acquired by daily contact with them. The professors seem to have made a genuine discovery which will have incalculable effects on medical education. We may again breed a race of family doctors for whom medicine is a practical art; we may one day give the family doctor a medical service in which ample diagnostic facilities are available for him and his patients.

KIDNEY EXTRACTS FOR HYPERTENSION

For several years the experimental and clinical studies on the use of kidney extracts in various types of hypertensive disease have been carefully followed by the medical profession. Conclusive results are not yet available. This is not surprising when one considers the possible variations in technic of preparing the extracts, the various types of hypertensive disease and the difficulty of translating observations on experimental animals into clinical potentialities. Recently Page and his co-workers,[1] using an extract similar to previous extracts but with the lipids removed (thereby decreasing the reactions), have reported a further extensive experimental and clinical study. They demonstrated that arterial blood pressure could be reduced by parenteral administration of kidney extract to dogs and rats with renal hypertension and to patients with essential and malignant hypertension. If administration of the extract is discontinued, however, the blood pressure, after a variable length of time, rises. Furthermore, coincident with the reduction in blood pressure, other objective and subjective signs of improvement have frequently occurred. The authors have encountered two sources of severe reactions to the injection of renal extracts. During the first there is generalized flushing of the skin and lacrimation, the blood pressure falls, dyspnea occurs and retrosternal pain or choking is felt. The patient is pale and perspiring, the extremities are cold and the heart rate is slow. After termination of the reaction, fever lasting several hours occurs. In the second type of reaction the blood pressure and pulse rate rise rather than fall. The patient complains of pain radiating from the site of the injection; spasm of the muscles and flushing and perspiring are observed. Although such reactions, these investigators state, are alarming, permanent aftereffects have not been observed. The studies reported by these Indianapolis investigators represent an important addition to knowledge of the subject; nevertheless this form of treatment has not yet passed the experimental stage and its use should be confined to qualified investigators until the indications and technics which are now merely promising have become established and standardized.

1. Page, I. H.; Helmer, O. M.; Kohlstaedt, K. G.; Kempf, G. F.; Gambill, W. D., and Taylor, R. D.: Ann. Int. Med. **15**: 347 (Sept.) 1941.

MEDICAL PREPAREDNESS

In this section of The Journal each week will appear official notices by the Committee on Medical Preparedness of the American Medical Association, announcements by the Surgeon Generals of the Army, Navy and Public Health Service, and other governmental agencies dealing with medical preparedness, and such other information and announcements as will be useful to the medical profession.

SUPPLY, PROCUREMENT AND ASSIGNMENT OF MEDICAL PERSONNEL

When the 1918 armistice was signed, the United States Army had 3,673,888 men in service and 31,501 Medical Corps officers. Should the United States Army be expanded for any reason in the near future to any similar size, at least an equivalent number of physicians would be required.

Today the United States Army includes approximately 90,000 officers, 6,000 nurses and 1,480,000 enlisted men. Of the 90,000 officers approximately 14,000 are in the medical department, and of the soldiers approximately 109,000 are in the medical department. The officers in the medical department include 11,465 physicians in the Medical Corps, of whom 8,983 are reserve officers, 1,250 regular officers and 1,232 National Guard officers. Calculated on a basis of 6 medical officers per thousand men there is at present a shortage of about 1,473 medical officers. The Army Medical Department also includes 2,300 dentists in the Dental Corps and 660 veterinarians in the Veterinary Corps.

Should the Army not be greatly expanded within the next year but continue with a training program of about the present scope, a maximum of approximately 3,200 replacements would be required each year for the next five years during the period of the Selective Service Act. It is estimated that approximately two thirds of the physicians now in service would elect to remain for the period of the emergency. If, however, it should not be possible to retain these men in service, the number needed for replacement would be considerably expanded.

The Army has a Medical Reserve Corps which includes some physicians who can be called for various types of military service. In calling men to service it is customary to call them from the Reserve Corps. Moreover, there are now organized a considerable number of sponsored units including general hospitals, field hospitals and smaller units. Today the so-called sponsored units include sixty-eight general hospitals, thirty evacuation hospitals and twenty-five surgical hospitals. These units are not yet an active part of the military establishment and the physicians associated with such units, if they are members of the Reserve Corps, may be called into service at any time. Then, if these units are ordered into service, those physicians who are affiliated may be detached from the service to which they are assigned and returned to the sponsored unit.

THE NAVY

The needs of the United States Navy have been satisfied by a considerable expansion of the regular Navy Medical Service. The Navy demands about 6.5 physician for every thousand of their personnel. At present enough physicians are enrolled to meet their needs so that a new increment of approximately 100 physicians is required now as replacements. It seems likely that by July 1942 with the expansion of the Navy another 700 physicians would be required. To meet this need the Navy has a pool of 1,000 in its Reserve Corps.

The Navy also requires from 12 to 15 dentists each year. There are now 650 dentists on active duty, of whom 300 are dental reserves. The Navy has, moreover, approximately 1,500 dentists on reserve status.

THE PUBLIC HEALTH SERVICE

The United States Public Health Service requires about 35 new officers each year to meet its normal requirements for replacements. However, in view of the present expanded activities the next year would require approximately 100 interns in public health service institutions. It also requires about 10 dentists each year in the form of new assignments and for replacements. At present the Public Health Service is recruiting physicians for defense areas, for service in extracantonment zones and for defense industries. Moreover, state health departments to meet new expansions require about 150 additional physicians.

The United States Public Health Service also maintains a reserve. Most of its men, however, are active in various state or local health positions. The removal of these men from such positions would, of course, require replacement.

THE UNITED STATES VETERANS BUREAU

The United States Veterans Bureau now has about 1,800 physicians in full time positions. About 500 of the physicians in the Veterans Bureau hold positions in the United States Army Medical Reserve Corps, as do also a considerable number of men in the field of public health either with local or with state organizations. In order to bring the Medical Reserve Corps of the Army into a position in which it could be counted as an active asset, all men holding reserve positions who are otherwise occupied in essential functions should resign their commissions from the United States Army Medical Reserve Corps.

THE CIVIL SERVICE COMMISSION

The Civil Service Commission provides many federal agencies with lists of physicians to meet their needs. Such agencies as the Indian Service, the Bureau of Mines, the Coast Guard Service, the Department of Pensions and many other groups employ physicians from the Civil Service lists. Altogether such agencies employ about 2,500 doctors. Each year they employ about 400 new men for replacements or for new positions. For the present fiscal year they lack 250 physicians to meet their requirements.

SUMMARY

An evaluation of the total number of physicians immediately required to meet various governmental needs during the next year would indicate between 2,000 and 3,000 unless there should be a sudden expansion of the United States Army.

PRESENT CONDITIONS

At present even the United States Army Medical Department may have difficulty in securing physicians for its needs.

When the Selective Service age was changed from 35 to 28 the possibility of securing any considerable number of medical men by Selective Service was greatly diminished; indeed, it almost eliminated the Selective Service as a source for securing physicians. The average age of graduation from medical school today is approximately 28 years. Following graduation the young physician must have an internship of at least one year in a recognized hospital. Many of the civilian hospitals of the country are already short of the number of interns that they require to carry on their service efficiently. Many of the large hospitals which employ considerable numbers of interns have established economy by reducing the number by one third to one half for the period of the emergency.

The medical schools of the United States graduate each year approximately 5,000 physicians. The number of physicians graduated is just about what is needed to supply the hospitals capable of extending the education of the young physician by an internship with the interns that they require. Many smaller hospitals having less than one hundred beds, which is the limit placed on an acceptable internship by the Council on Medical Education and Hospitals of the American Medical Association, find it difficult if not impossible to secure interns at this time. Indeed, such hospitals have become accustomed to paying fairly good salaries to young men, who then take a second or a third year of training in the smaller hospitals. By the time the

physician has completed his internship he is in many instances married. The estimates would indicate from one-fourth to one-half the total number as being with dependents by the time they have finished the intern period.

Moreover, among physicians, as among the public generally, in view of the high physical standards maintained by the United States Army and Navy, slightly over one half of the young physicians are able to qualify physically for commissions in the Army or Navy Medical Corps. Indeed, it has been suggested that a different standard be maintained for physicians particularly as relates to minor defects of vision which are correctable with eyeglasses or to some similar defect in order to enable such physicians to be commissioned in the Medical Corps. In many instances these men would be quite capable of giving good medical service without the likelihood that they would eventually become a dependent of the government.

In addition to the demands made on the medical profession by the services already mentioned there is the necessity for some service related to civilian defense, to the Selective Service and to expanded war industries. Thus many of the large construction projects of both the Army and the Navy demand physicians who are being employed as contract physicians and surgeons for the period of construction.

Moreover, in order to provide for a continuous supply of men with specialized training, approximately 800 to 1,000 of the young men who have completed one or two years of internship must take an additional three to five years of residency or specialistic training to qualify before the various boards which examine and certify men in the specialties.

LABORATORY AIDS IN THE DIAGNOSIS OF NEUROTROPIC VIRUS DISEASES

The Office of the Surgeon General, preventive medicine division, has just issued a circular letter on aid in diagnosis of neurotropic virus diseases.

In recent years valuable new laboratory procedures have been developed for the diagnosis and differentiation of certain neurotropic virus diseases. In addition to complement fixation and neutralization tests performed with the patient's blood serum, identification of the virus agent in certain of these diseases may be effected under favorable conditions.

The Virus Laboratory of the Army Medical School, with the collaboration of the Commission on Neurotropic Virus Diseases and the Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army will undertake to perform these special diagnostic tests on specimens submitted from the field. It is desired that this diagnostic service be utilized whenever feasible.

The following scheme indicates the special tests which may be employed. In each instance the type of test to be performed will be determined at the Army Medical School on receipt of the specimen and the orienting clinical data.

	Tests on Serum			Tests on Brain and Spinal Cord	
Disease	Complement Fixation	Neutralization	Virus Studies	Virus Studies	Microscopic Examination
Acute aseptic meningitis or lymphocytic choriomeningitis	+	+	+	0	0
St. Louis encephalitis	+	+	0	+	+
Lethargic encephalitis (von Economo)	0	0	0	0	+
Herpes simplex encephalitis	0	+	0	+	+
Rabies encephalitis	0	0	0	+	+
Equine encephalomyelitis	+	+	0	+	+
* Poliomyelitis	0	+	0	+	+
** Postinfectious encephalitis	0	0	0	0	+

* In cases of poliomyelitis, serum specimens should be submitted for these special tests only when doubt exists as to the diagnosis. In all cases of fatal poliomyelitis, specimens of brain and spinal cord should be collected as directed in paragraph 2 *b* (3) in the circular and forwarded for virus identification and microscopic examination.

** This classification includes mumps meningoencephalitis, postmeasles encephalitis, postinfluenzal encephalitis, postvaricella encephilitis, postvaccinal encephalitis and postrabic treatment encephalitis.

Complete details are supplied in the circular (No. 107) on the technic of collecting material for examination.

RED CROSS PLANS ENLARGED FIRST AID PROGRAM

The American Red Cross launched, October 15, an extensive program for training first aid instructors. The courses will consist of forty-five hours of classroom study and practice and will emphasize particularly emergency care of persons affected by war gas, control of bleeding, transportation of the wounded and other first aid problems now being experienced in bombed civilian centers in Europe. The instructors for Civilian Defense groups will be augmented by some thirty thousand instructors who are already active in Red Cross chapters throughout the county. The Red Cross is also expanding its training of first aid instructors for the Army and Navy, the CCC and for municipal police and fire departments. Corps of instructors have already been qualified in thirty Army camps and Navy stations, and these instructors are teaching standard first aid to thousands of service men.

Every instructor impresses on all whom he teaches that first aid never serves as a substitute for professional medical assistance. It is intended only to bridge the gap between the occurrence of an accident and the arrival of a physician.

During the past year more than one hundred and thirty thousand CCC enrollees were taught Red Cross first aid through instructor schools set up on a similar basis. New York is the most recent municipality to make Red Cross first aid required training for firemen. A program has been put into motion there by Fire Commissioner Patrick Walsh to train all of the city's ten thousand firemen who to date have not completed a standard course. Running parallel to these training projects, the Red Cross is expanding Red Cross facilities to train first aid detachments in industry, office buildings, schools and other buildings where large numbers of persons live or work. The project calls for training units large enough to care for casualties in buildings to which they are assigned. In the event of a nearby catastrophe, units from unaffected buildings would be rushed to the scene by a central coordinator.

The Red Cross first aid program is supported from annual dues of members. The organization's annual Roll Call of members begins November 11 and continues through November 30.

ADVANCED FIRST AID FOR CIVILIAN DEFENSE

The U. S. Director of Civilian Defense has urged all communities to spread knowledge of first aid as widely as possible among the people. Competent instructors qualified by the American Red Cross are required for training civilian defense workers, employees of industrial plants, business establishments and government bureaus. For this purpose, physicians should register as instructors with the local Red Cross chapter and should employ the "Instructor's Outline" for the standard course (twenty hours), prepared by the American National Red Cross in collaboration with the Medical Division of the Office of Civilian Defense and published by the American Red Cross. On completion of this course, participants will be entitled to receive the First Aid Certificate of the Red Cross and be authorized to wear the appropriate insigne.

The booklet entitled "Advanced First Aid for Civilian Defense," prepared by the American National Red Cross in collaboration with the Medical Division of the Office of Civilian Defense and published by the American Red Cross, is intended for the first aid instruction of the medical and nursing personnel of emergency medical field units and for the training of air raid wardens and members of other enrolled groups of the Citizen's Defense Corps.

Physicians who are members of emergency medical field units should familiarize themselves with the first aid methods outlined in this booklet. They should register in the local Red Cross chapter so that they may serve as instructors to both student and graduate nurses as well as nurses' aides and other nonprofessional members of their unit and other hospital employees. These five two-hour lessons will not provide nonmedical civilian defense workers with adequate training and experience in the skilful application of first aid procedures. They are intended

to supply minimum instruction which must be followed by repeated drilling under competent supervision.

Because of the exacting training requirements for certain enrolled groups of the Citizen's Defense Corps, this ten-hour course, "Advanced First Aid for Civilian Defense," may be interpolated in their instructional curriculum with the understanding that it will be supplemented subsequently by additional first aid training as required for others who have not had previous experience.

Copies of "Advanced First Aid for Civilian Defense" are obtainable for free distribution by application to the regional director or regional medical officer in your civilian defense region. For copies of the "Instructor's Outline" (twenty-hour course), applications should be addressed to the local Red Cross chapter.

PLAN TO REHABILITATE REGISTRANTS WITH DENTAL DEFECTS

Lieut. Comdr. C. R. Wells, chief dental officer of the Selective Service System, announced at the convention of the American Dental Association in Houston, Texas, October 29, that the Selective Service System would begin treatment of dentally defective registrants as its first step to carry out President Roosevelt's request for the rehabilitation of registrants having remediable physical defects. About 100,000 registrants rejected for dental defects can thus be made available for military service. Those to be rehabilitated will be called before the local boards and their gross dental defects recorded to determine whether there are any men who would obviously not be accepted for military service. All remaining registrants will be sent to an Army examination station where a thorough dental examination will be made.

In the case of all registrants not accepted without qualification, the Army dental surgeons will state definitely whether the defects can be remedied and the men made fit for general military service. Those found to have remediable defects will return to the local boards, which will authorize the treatment and refer them to dentists in their own community. The cost of the treatment will be borne by the federal government.

Thus the civilian practitioners will rehabilitate the men in their communities. The program will be under the direction of Selective Service through the local board members and the physicians and dentists assigned to the local boards.

MEDICAL REHABILITATION PROGRAM FOR YOUTH

A campaign of medical rehabilitation of youth unfit to serve with the armed forces is being carried on by the NYA health service, it was announced October 20 by Miss Helen M. Harris, National Youth Administrator for New York City and Long Island. More than 18,000 young men and women have been examined in the NYA health centers since the inauguration of the medical program in September 1940 and 50 per cent of these are either now under medical care or have had their medical defects remedied. Since the NYA is not permitted to give remedial treatment, the young people are referred either to their family physician or dentist or to clinics.

Citing the work of the health unit of the Brooklyn Work Center, 980 Atlantic Avenue, Dr. Harold Jacobziner, medical director of the program, explained that since the unit has been opened in the middle of August 1,162 youth workers have received complete physical examinations.

Of the youths examined, Dr. Jacobziner revealed that only 68 were fit for all kinds of work and all types of athletic activity, 520 had easily correctable defects, 372 had minor uncorrectable defects and 202 were definitely limited in their employability by uncorrectable defects. More than 200 of these youths are now under medical care. Of these, 41 per cent are utilizing private medical and dental aid while the remainder are using clinics. At the Brooklyn Center every youth referred for remedial treatment has received an average of two and one half follow-up examinations by NYA physicians.

The local medical societies also are cooperating with the NYA health program.

ARMY CREATES POST OF THE AIR SURGEON

The War Department announced, October 24, the creation of the post of the Air Surgeon, with Col. David N. W. Grant, Medical Corps, as the first officer to be named to the position.

Colonel Grant, as the Air Surgeon, will be a member of the staff of Major General Henry H. Arnold, Chief of the Army Air Forces, and will head a service to coordinate the medical activities of the Army Air Forces. Colonel Grant also will retain his post as Chief of the Medical Division, Office of the Chief of the Air Corps.

Colonel Grant entered the Army Medical Corps as a first lieutenant in July 1916. Since 1930 he has been on duty with the Army Air Corps. He received his M.D. degree from the University of Virginia Department of Medicine, Charlottesville, and is a graduate of the Army Medical School, the School of Aviation Medicine at Randolph Field, the Air Corps Tactical School and the Chemical Warfare School.

LIBRARY SERVICE FOR PATIENTS IN GENERAL HOSPITAL

Library service will be provided for patients at nine general hospitals being constructed by the Army through the establishment of a five thousand volume library at each of the new institutions. About $57,600 has been allotted for the initial purchase of books. The War Department, through the Army Library Service, will furnish four thousand of the books for each library, and the librarian in charge of each unit will select the remainder of the quota.

Librarians for the hospital libraries will have to meet the same requirements as those serving in other Army libraries. They will be chosen by the corps area commander having jurisdiction over the respective hospitals.

Library service will be inaugurated as soon as the hospital construction is completed. It is expected that all work will be finished within the next month.

Hospitals where the new libraries will be established include:

Barnes General Hospital, Vancouver Barracks, Wash.
Billings General Hospital, Fort Benjamin Harrison, Ind.
Hoff General Hospital, Santa Barbara, Calif.
La Garde General Hospital, New Orleans.
Lawson General Hospital, Atlanta, Ga.
Lovell General Hospital, Fort Devens, Mass.
O'Reilly General Hospital, Springfield, Mo.
Stark General Hospital, Charleston, S. C.
Tilton General Hospital, Fort Dix, N. J.

MEDICAL ADVISERS TO THE NAVY

Three physicians have been appointed as consultants to the medical department of the U. S. Navy, newspapers reported October 15. They are Drs. Frank H. Lahey, Boston, President of the American Medical Association; Donald C. Balfour, director of the Mayo Foundation, Rochester, Minn., and Wilbur A. Sawyer, New York, director of the International Health Division of the Rockefeller Foundation.

GRADUATION AT SCHOOL OF AVIATION MEDICINE

Graduating exercises were held at the School of Aviation Medicine, Randolph Field, Texas, October 15 for a class of flight surgeon assistants. The address was given by the commander of the school, Lieut. Col. Eugen Reinartz, M. C., and the diplomas were presented by Capt. R. L. Fisher, M. C.

MONTHLY MEETING OF MEDICAL OFFICERS

Surgeon Gen. James C. Magee has announced that monthly meetings of medical department officers residing in and near Washington, D. C., will be held at 8 p. m. at the Army Medical Center on the third Monday of each month from October to May.

ORGANIZATION SECTION

MEDICAL ECONOMIC ABSTRACTS

CARE OF THE MENTALLY ILL

The care of the mentally ill has been most inadequate. Dr. Victor H. Vogel, past assistant surgeon of the United States Public Health Service,[1] begins a discussion of this subject by noting that "the deplorable conditions in many state hospitals for the mentally ill and the huge costs of this type of illness have been recently discussed in several popular magazines and newspapers of wide circulation." The overcrowded condition of such governmental institutions for the care of the mentally sick has been pointed out annually in the reports of the Council on Medical Education and Hospitals of the American Medical Association.

This is the largest section of the field of health care that from its very nature is necessarily confided to governmental agencies. All stages of the detection, commitment and care of the mentally diseased is also a governmental function, and the way in which this function is performed is described by Dr. Vogel as follows:

> Archaic, persecutory commitment practices, which include court appearances and sometimes jury trials, help to perpetuate this attitude. In too many states the mentally ill are thrown into jail, after which they are transported to the state hospitals by sheriffs, who frequently substitute handcuffs, chains, and strait jackets for humane, intelligent handling, which could be furnished by the state hospital attendants. Why should a mentally ill patent be handled as a criminal in order to get for him the treatment that he needs?

PHYSICIANS PAY IN BRITISH HEALTH INSURANCE

In the midst of the war, the government of Great Britain decided to increase the coverage under health insurance by raising the income limit from £250 to £420 (at the present rate of exchange from about $1,000 to $1,700). This of course greatly decreased the field of private practice by removing those manual workers with sufficient incomes to pay for their medical services. At the same time some two million of the healthiest section of the population were taken into the army. Most of these were formerly under insurance. This meant that the insured are now the least healthy section of the community and require more medical care per person than before this change took place. The rapid increase in the cost of living also hit the panel physicians especially hard.

Physicians in the British insurance system have always been underpaid. There have been several changes in the capitation fee, but at the beginning of the war it was 9 shillings per annum (less than $2 a year at present). Although there has been a sort of "gentlemen's agreement" since the introduction of the insurance system by Lloyd George that no change affecting the medical profession would be made in insurance legislation without first consulting the British Medical Association, the government announced the increase of coverage without any such consultation.

The result was almost a universal protest on the part of the physician. The government made an offer of an increase of 6d and, when it was seen that this would not satisfy the physicians, this was raised to 9d (about $0.15). The physicians looked on this as wholly inadequate, and as a result a special panel conference was held at the headquarters of the British Medical Association.[1] This meeting was decidedly stormy. Speaker after speaker echoed the statements of the first one to discuss the subject that "the capitation fee never had been adequate but whenever the rank and file wished to bring the matter to a head they were always met with the well worn phrase that the time was not opportune." Another physician related that in a previous discussion when an insurance doctor complained that the standards of service could not be maintained with such low rates of pay the medical officer replied "twopence a week is what you are going to get. You must scale your work down to twopence a week, and if you want to do better work you must do it as a hobby." Another physician presented a chart showing that from 1914 to 1941 the work of a panel physician "had increased by 100 per cent, the cost of living by 100 per cent, the fee by only 28 per cent and they were offered 9d."

The conference was finally forced to recognize that it was helpless to accomplish anything and adopted the following motion:

> That this Conference, in view of the national emergency now existing, cannot do otherwise than accept the Minister's offer of a capitation fee of 9s 9d, but in doing so wishes to record an emphatic protest against
> (1) The inadequacy of the offer and
> (2) The fact that a new group of insured persons has been admitted to insurance without previous consultation with the profession.

1. Vogel, V. H.: Pub. Health Rep. **56:** 1941-1947 (Oct. 3) 1941.

1. Supplement to British Medical Journal, Aug. 16, 1941, pages 21-25.

WOMAN'S AUXILIARY

Arkansas

The Woman's Auxiliary to the Arkansas Medical Society opened its seventeenth annual meeting in Little Rock, April 14, 1941.

The following officers for 1941-1942 were elected: president, Mrs. Calvin A. Churchill, Batesville; president-elect, Mrs. L. G. Fincher, El Dorado; vice presidents, Mrs. C. W. Dixon, Gould, Mrs. Fred Hames, Pine Bluff, Mrs. J. B. Jameson, Camden, and Mrs. H. T. Smith, McGehee; historian, Mrs. C. W. Garrison, Little Rock; publicity secretary, Mrs. Ralph Cross, Texarkana; treasurer, Mrs. Fount Richardson, Fayetteville; parliamentary referee, Mrs. C. H. Lutterloh, Hot Springs.

Iowa

The Thirteenth Annual Convention of the Woman's Auxiliary to the Iowa State Medical Society was held in Davenport, May 14-15, 1941. Membership in the state auxiliary was reported to have increased from 340 to 464. The Gertrude Downing membership cup was awarded to the Polk County auxiliary for having made the greatest percentage of gain in membership during the preceding year. Major A. K. Stiles of the Rock Island Arsenal gave an address on national defense. Greetings were extended by Dr. Nathan B. Van Etten of New York, then president of the American Medical Association; Dr. Frank P. McNamara of Dubuque, president of the Iowa State Medical Society, and Dr. Earl B. Bush of Ames, president-elect of the Iowa State Medical Society. In a symposium Dr. John H. Randall of Iowa City discussed cancer control and Dr. Donald C. Conzett of Dubuque discussed crippled children and read a paper written by Dr. James A. Downing of Des Moines on "The League for the Hard of Hearing." Officers elected were as follows: president, Mrs. W. R. Hornaday, Des Moines; president-elect, Mrs. F. W. Mulsow, Cedar Rapids; vice presidents, Mrs. J. F. Veltman, Winterset, Mrs. A. H. Hendrickson, Sioux City, Mrs. Isaac Sternhill, Council Bluffs, and Mrs. L. A. Coffin, Farmington; secretary, Mrs. M. J. Moes, Dubuque, and treasurer, Mrs. A. E. Merkel, Des Moines.

New York

The Nassau County auxiliary met in Mineola. Mrs. Robert Oliver, president of the Suffolk County League of Women Voters, spoke on "The Child Guidance Clinic."

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST: SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION AND PUBLIC HEALTH.)

ARKANSAS

Two Day Course of Postgraduate Instruction. — The committee on postgraduate instruction of the Arkansas Medical Society conducted its tenth two day course of postgraduate instruction at the University of Arkansas School of Medicine, Little Rock, October 22-23. The morning of the first day was devoted to a symposium on the clinical use of the vitamins. Included among the speakers on the general program were:

Dr. Grady W. Reagan, Little Rock, Early Diagnosis of Prostatic Obstruction.
Dr. Merlin J. Kilbury, Little Rock, Fungous Diseases.
Dr. Frederick W. Harris, Little Rock, Cardiac Emergencies.
Drs. Paul L. Mahoney and John S. Agar, Little Rock, Diagnosis and Treatment of Neuralgias of Dental Origin.
Dr. Barton A. Rhinehart, Little Rock, Medical Treatment of Patients with Cancer.
Miss Beatrice Hodnett, Mrs. Norma Gaston and Miss Margaret Paynter, Some Important Features in the Business of the Practice of Medicine: A Presentation of the Doctors' Secretaries Club of Little Rock.

One session was devoted to a discussion of sulfonamide drugs with Drs. John N. Compton, Little Rock, speaking on "Present Status of Sulfonamide Therapy"; Charles Wallis, Little Rock, "Experiences with Sulfaguanadine in Diarrhea and Dysentery," and Carl L. Wilson, Fort Smith, "Sulfapyridine Anuria." A surgical clinic concluded the first day's meeting and a medical clinic the second day's program.

CALIFORNIA

Society News.—The San Francisco County Medical Society devoted its meeting, October 14, to a discussion of "The Sulfa Family—1941" with the following speakers: Drs. Edmund F. Anderson, John W. Brown, Windsor C. Cutting, Arthur Haim, Clark M. Johnson, Carleton Mathewson Jr. and Lowell A. Rantz. All are from San Francisco.——The Los Angeles Society of Neurology and Psychiatry was addressed, October 15, by Drs. Charles Posner, Pasadena, on "Behavior Problems in Children in Relation to Endocrine Dysfunction" and Charles Hunter Shelden, Los Angeles, "Congenital Chiasmal Lesions."

Medal Presented to Dr. Guedel.—Dr. Arthur E. Guedel, Los Angeles, was guest of honor at a dinner, October 21, given by the section on anesthesia of the Los Angeles County Medical Association to mark the presentation to him of the Hickman Medal by the Royal Society of Medicine, London. At the dinner a representative of the British government made the presentation on behalf of the Royal Society of Medicine. The principal address was delivered by Chauncey D. Leake, Ph.D., librarian of the medical school library, professor of pharmacology and lecturer in medical history and bibliography, University of California Medical School, San Francisco.

CONNECTICUT

Twenty-Seven Years a Hospital Superintendent.—Dr. Charles T. LaMoure has retired after twenty-seven years' service as superintendent of the Mansfield State Training School and Hospital, Mansfield Depot. He was succeeded on October 1 by Dr. Neil A. Dayton, Boston, formerly director of statistics and director of mental deficiency in the Massachusetts State Department of Mental Health. Dr. LaMoure graduated at Albany Medical College in 1894. He was superintendent of the Gardner State Colony from 1911 to 1914, when he became superintendent of the Mansfield institution. At one time he was president of the Connecticut Society of Psychiatry. Dr. Dayton graduated at Ohio State University College of Homeopathic Medicine, Columbus, in 1915. He became assistant to the commissioner of the Massachusetts State Department of Mental Diseases in 1926 and in the same year director of the division of mental deficiency. In 1938 he was president of the American Association on Mental Deficiency.

FLORIDA

Clinical Session.—Dr. George G. Oswalt, Mobile, Ala., was chosen president of the Gulf Coast Clinical Society at its sixth annual meeting in Pensacola October 16. Drs. Donald G. Rafferty, Pass Christian, Miss., and Sidney G. Kennedy Jr., Pensacola, were named vice presidents. Dr. Charles L. Rutherford, Mobile, is the secretary. The 1942 session will be held in Mobile. Speakers on the program included Drs. Edgar Burns, New Orleans, on "Treatment of Urinary Infections"; James S. McLester, Birmingham, "Functional Disorders of the Digestive Tract"; Philip S. Hench, Rochester, Minn., "Management of Chronic Arthritis"; Warren T. Vaughan, Richmond, Va., "Allergic Factor in Certain Dermatoses."

IDAHO

Society News.—The Southwestern Idaho Medical Society was recently addressed in Boise by Dr. Frank H. Lahey, Boston, President of the American Medical Association, on "New Advances in Medicine and in Surgery." He also conducted a clinic on diseases of the thyroid gland at St. Luke's Hospital.

Personal.—Dr. Ruth J. Raattama, Springfield, Ill., has been appointed director of maternal and child health and crippled children of the state department of health, according to *Northwest Medicine.*——Dr. Paul R. Ensign, Topeka, Kan., has been named director of the Boise-Ada County health unit, effective next June. Until that time Dr. Gustavus Denton Bock, Boise, will be acting director, according to *Northwest Medicine.*

KENTUCKY

State Medical Election.—Dr. E. Murphy Howard, Harlan, was chosen president-elect of the Kentucky State Medical Association at its annual meeting in Louisville, October 2. Dr. Elmer L. Henderson, Louisville, was inducted into the presidency. Other officers include Drs. Luther Bach, Bellevue; Michael J. Henry, Louisville, and Charles F. Long, Elizabethtown, vice presidents. The 1942 annual convention will be held in Murray.

MASSACHUSETTS

District Meeting.—The first regular meeting of the Norfolk District Medical Society was held at the U. S. Marine Hospital, Brighton, October 28. The speakers included: Sr. Surg. Richey L. Waugh, Boston, "Treatment of Fractures"; P. A. Surg. James F. Spindler, Boston, "Treatment of Gonorrhea"; P. A. Surg. Thomas R. Dawber, Mobile, Ala., "Treatment of Pneumonia," and Surg. Lee C. Watkins, Boston, "Treatment of Injuries of the Eye."

Personal.—Harvard University, Cambridge, announced on October 3 the following appointments to the teaching and research staff, among others: Dr. Norbert A. Wilhelm, superintendent of the Peter Bent Brigham Hospital, Boston, as lecturer on public health practice; Dr. William V. Knoll, pathologist of the Robert B. Green Memorial Hospital, San Antonio, Texas, as Lucius N. Littauer fellow in pathology at the Collis P. Huntington Memorial Hospital, Boston, and Dr. Edward J. Welch, Milton, assistant medical adviser.

MICHIGAN

University News.—Charles Judson Herrick, Sc.D., Grand Rapids, professor emeritus of neurology, University of Chicago School of Medicine, has given an extensive collection of reprints and books to the department of anatomy at the University of Michigan Medical School, Ann Arbor.

State Medical Election. — Dr. Howard H. Cummings, Ann Arbor, was named president-elect of the Michigan State Medical Society at its recent annual meeting in Grand Rapids and Dr. Henry R. Carstens, Detroit, was inducted into the presidency. The secretary, treasurer, editor and executive secretary are elected annually by the council of the state society at its midwinter meeting in January.

Society News.—Dr. Walter G. Maddock, Ann Arbor, discussed "Surgical Aspects of Gallbladder Diseases" before the Genesee County Medical Society in Flint October 14.——Dr. Frank V. Theis, Chicago, addressed the Marquette-Alger Counties Medical Society September 30; his subjects were "Diagnosis and Treatment of Peripheral Circulatory Disturbances," "Diagnosis and Treatment of Varicose Veins" and "Observations on Biochemical Blood Changes."

Changes in Health Officers. — Dr. Richard F. Boyd, Topeka, Kan., has been appointed director of the Midland County health department, succeeding Dr. Kalman S. von Haitinger, who resigned to engage in private practice in Midland, it is reported. Dr. Boyd has been director of local health services for the Kansas State Board of Health. Dr. Leonard C. Bate, Greenup, Ky., health officer of Greenup County, Ky., has been appointed to a similar position in Iron County, succeeding Dr. Lorin E. Kerr Jr., Stambaugh, who resigned to go to Ohio.

NEW JERSEY

Hospital News.—Dr. Ernst P. Boas, New York, gave the first of a series of lectures at Aurora Institute, Morristown, October 5, on "Angina Pectoris, Coronary Insufficiency and Cardiac Infarction."

Industrial Medicine and Civilian Defense.—The fourth annual fall clinical conference of the Medical Society of New Jersey will be held, December 3, in Elizabeth on the theme "Industrial Medicine and Civilian Defense." The morning session will be devoted to clinical presentations at the Elizabeth General Hospital, St. Elizabeth Hospital and the Alexian Brothers' Hospital, Elizabeth. Scientific papers will make up the afternoon's program and in the evening the banquet will be addressed by Johannes Steel, radio commentator.

NEW YORK

Society News.—Dr. James M. Blake, Schenectady, was elected president of the State Association of Superintendents and Managers of Tuberculosis Sanatoria at the annual meeting in Utica, September 19, and Dr. Robert E. Plunkett, Albany, was reelected secretary.——Dr. Herman O. Mosenthal, New York, addressed the Medical Society of the County of Nassau, Garden City, September 30, on "Treatment of Diabetes."——Dr. Walter L. Niles, New York, addressed the Medical Society of the County of Westchester, White Plains, October 21, on "The Art of the Practice of Medicine."——Dr. Russell Plato Schwartz, Rochester, addressed the Chemung County Medical Society, Elmira, September 10, on "Growing Feet of Children."——Drs. John H. Born, New York, and Seth R. Jagger, Westhampton Beach, addressed the Hampton Clinical Society, September 19, on "Common Diseases of the Eye" and "Congenital Abnormalities" respectively.

New York City

Dr. Du Bois Honored on Retirement.—Friends and colleagues of Dr. Eugene F. Du Bois gave a dinner, October 9, at the Waldorf-Astoria to mark his retirement as physician in chief of the New York Hospital and professor of medicine at Cornell University Medical College. He will continue as professor of physiology and head of the department of physiology and biophysics. Dr. Du Bois has been connected with Cornell since 1910, first as instructor in applied pharmacology, then associate professor of medicine and since 1930 professor of medicine. He had been physician in chief of the New York Hospital since 1932. He has also been medical director of the Russell Sage Institute of Pathology. Dr. Du Bois received his degree at Columbia University College of Physicians and Surgeons in 1906.

Award to Mrs. Ehrlich.—The widow of the discoverer of arsphenamine, Mrs. Paul Ehrlich, was presented with a check for $1,000 at a dinner, October 11, held to commemorate the thirtieth anniversary of the discovery. Dr. Ehrlich died in 1915. The dinner was given at the Waldorf-Astoria by the National Anti-Syphilis Committee under the auspices of the American Social Hygiene Association. The speakers included Dr. Thomas Parran, surgeon general, U. S. Public Health Service, Washington, D. C.; Dr. Hubert S. Howe, chairman of the Committee on Research on Syphilis, and Mrs. Ehrlich. Hon. Frances Payne Bolton, Cleveland, Member of Congress and vice chairman of the antisyphilis committee, presided. Mrs. Ehrlich has been in this country for two months as a refugee from Germany, according to the New York *Times*.

Society News.—The New York Surgical Society was addressed, October 22, among others, by Dr. William L. Watson on "Surgery of the Cervical Esophagus."——Speakers at a meeting of the Medical Society of the County of New York October 27 were Dr. Nathan B. Van Etten on "Triumphs of Optimism in Social and Scientific Medicine, 1841-1941" and the Hon. Bernard L. Shientag, judge of the Supreme Court of the State of New York, on "Whither Medicine?"——Dr. John J. Bourke, Albany, N. Y., addressed the Bronx County Medical Society, October 22, on "Health Defense and Emergency Medical Service and Their Relation to the General Defense Program in New York State" and Dr. Abner Stern gave his official address on becoming president of the society.——Dr. Robert S. Hotchkiss addressed the Bronx Gynecological and Obstetrical Society, October 27, on "Management of Aspermia."——The Brooklyn Academy of Pediatrics was addressed, October 22, by Drs. George A. Jervis, Thiells, on "Metabolic Disorders in Mental Deficiency," and Edward J. Donovan, "Anomalies of the Gastrointestinal Tract in Infants and Children."

NORTH CAROLINA

Bowman Gray Medical School Formally Opened.—The Bowman Gray School of Medicine of Wake Forest College, Winston-Salem, was formally opened on September 11. With Dr. Thurman D. Kitchin, president, presiding, the speakers included:

Mr. Santford Martin, editor, Winston-Salem *Journal and Sentinel*, A Vision Becomes a Reality.
Dr. Thomas T. Mackie, New York, The Challenge of a New Medical School to the Faculty, Students and Community.
Dr. Fred C. Zapffe, Chicago, Responsibilities for the Financial Needs of Medical Education.

In 1939, the Wake Forest College School of Medical Sciences, which offered only the first two years in medical training, announced that it would move to Winston-Salem and expand into a four year school. The change was made possible under a gift from the Bowman Gray Fund from the estate of the late Mr. Gray, a tobacco magnate of Winston-Salem. The building is planned so that the laboratory-classroom portion and the hospital are under one roof with communicating floors. The pediatric wing, a gift of Mr. Richard J. Reynolds, Winston-Salem, will be known as the Catherine Smith Reynolds Wing in honor of his mother. It will accommodate forty children. To the right of the entrance of the hospital, the hallway enters into the first floor of the medical school wing, which is six stories high. On the ground floor is the department of biochemistry containing a classroom to accommodate fifty students, five offices for the staff and five research laboratories. On the second floor is the department of pathology and bacteriology, the third the department of physiology and pharmacology and the fourth the department of anatomy. The fifth floor is occupied entirely by the animal quarters. There are large refrigerating rooms on each floor and constant temperature rooms on the floors occupied by biochemistry and physiology. On each floor at the junction of the medical school wing and the hospital are seminar examining rooms for clinical instruction.

An amphitheater will seat three hundred and fifteen persons. The second floor of one wing contains the surgical wards with eighty-six teaching beds and eleven private rooms. The third floor houses the medical wards with fifty-one teaching beds and forty-six beds for private patients. The entire hospital, including bassinets, has three hundred and forty-seven beds.

The medical curriculum is presented to the student as an integrated whole rather than as departmental projects. From the first day the student is given regular weekly clinics in medicine and surgery, cases being used which illustrate the topics under consideration in anatomy, biochemistry, physiology, pharmacology, pathology and bacteriology. At the end of the four year period each student will be given a comprehensive examination on the entire subject of medicine, including the fundamental sciences. Instead of the customary three months vacation in summer, a two months period is to be given in summer and one month in midwinter. During the senior year each student will be required to spend one month with a practicing physician, preferably one doing general practice in a rural community. These physicians are selected from the group of general practitioners in North Carolina and will be required to report to the school on a written form their impressions of the students' training, pointing out weaknesses that may be in the curriculum. During this period with the practicing physician, as well as during his clerkship, the student will be given opportunity to examine private patients to become acquainted with the problems confronted in the private practice of medicine. Dr. Coy C. Carpenter, dean of the two year school at Wake Forest, is dean of the Bowman Gray School of Medicine.

OHIO

Changes in Health Officers.—Dr. John A. Carter, Batavia, since 1936 health officer of Clermont County, has been named to a similar position in Middletown County.——Dr. Benjamin C. Houghton, Columbus, has been appointed local health commissioner of Upper Arlington.

Bequest to Medical College.—Mrs. Margaret S. Rockhill, Cincinnati, editor of the *Women's Medical Journal*, who died on June 6, left a trust fund to the University of Cincinnati College of Medicine to finance a fellowship in memory of her late husband, Dr. Charles S. Rockhill. The fellowship will be for students specializing in diseases of the chest. After twenty years the trust, which provides for several other gifts, will be closed and the entire estate will go to the university. An estimate of $35,000 was placed on the estate.

Regional Meeting. — Three New York physicians were guest speakers at the annual meeting of the Northwestern Ohio Medical Association, Napoleon, October 7, as follows: Drs. Rupert F. Carter on "Medical and Surgical Diagnosis and Treatment of Gallbladder Disease"; Irving S. Wright, "The Problem of Peripheral Vascular Disease," and Zacharias Bercovitz, "Diagnosis and Treatment of Acute and Chronic Dysentery." Dr. Hardy A. Kemp, dean, Ohio State University College of Medicine, Columbus, addressed the luncheon session on "Present Day Trends in Medical Education." The meeting was sponsored by the third and fourth councilor districts of the Ohio State Medical Association. The northwestern Ohio Medical Association comprises twenty-two counties in its area.

NYA Health Program Curtailed. — The state medical journal announces that the NYA health program which has been under way in Ohio since last spring has been curtailed because of a reduction in the funds allowed to the state for administrative purposes. The funds now available will not permit the state program to operate all of its work experience projects and leaves no surplus for health activities. A health program is being conducted at each of the five resident centers where youths are housed on a twenty-four hour basis, but for the time being the NYA will be unable to finance other health programs. In some communities, however, the health examinations are being continued by physicians who have been participating without remuneration. At the time of the retrenchment, the physical examination program was in operation in twenty-seven counties and tentative arrangements had been made for its operation in twenty-four other counties.

OKLAHOMA

Dates for State Meeting Changed.—The Oklahoma State Medical Association has announced that its 1942 meeting, originally scheduled for May 4-6, will be held April 29-May 1. The session will be held in Tulsa, with the Tulsa County Medical Society acting as host, and will commemorate the fiftieth anniversary of the association.

Service for the Underprivileged.—The Variety Club of Oklahoma City has erected a building costing $55,000 and dedicated it to better care for the underprivileged. The club maintains the building and provides free housing, utilities and janitor service for certain health agencies, it is reported. One of the first groups to move into the building was the Oklahoma County Public Health Association.

Society News. — The Ottawa County Medical Society devoted its meeting in September to a pediatric clinic at the Miami Baptist Hospital, Miami; Drs. Frank C. Neff, Kansas City, Mo., and Lawrence E. Maurer, Kansas City, Kan., were the guest speakers.——Dr. Leroy A. Calkins, Kansas City, Mo., addressed the Tulsa County Medical Society in Tulsa, October 27, on "Predicting the Duration of the First Stage of Labor." Dr. Frank A. Stuart Jr., Tulsa, was the speaker, October 13, on "Method to Determine the Prognosis of Fractured Hips."——Dr. Frank M. Keen, Shawnee, addressed the Pottawatomie County Medical Society, October 18, on "Rheumatic Heart Disease."

OREGON

North Pacific Surgical Meeting.—The annual meeting of the North Pacific Surgical Association will be held in Portland, November 10-11. Dr. Stuart W. Harrington, Rochester, Minn., will be the guest speaker. His topics will be "Esophageal Diverticula," "Esophageal Hiatus Hernia" and "Breast Surgery." Other speakers will include:

Dr. John C. Adams, Portland, Milk Leg.
Dr. Harry C. Blair, Portland, Compound Fractures.
Dr. Richard E. Ahlquist, Spokane, Total versus Subtotal Abdominal Hysterectomy.
Dr. Frank M. Byrant, Victoria, B.C., Rupture of the Uterus with Report of One Case.
Dr. Leo S. Lucas, Portland, Operative Stabilization of Old Congenital Dislocated Hip.
Dr. Joseph W. Lynch, Spokane, Brain Abscess.
Dr. John E. Raaf, Portland, Osteomyelitis of the Skull.
Dr. Joseph A. Pettit, Portland, Infections of the Lip and Face.
Dr. Goodrich C. Schauffler, Portland, Methods of Evaluating Surgical Hand Cleaning.
Dr. John R. Hand, Portland, Cortical Infections of the Kidney.
Dr. Alexander H. Peacock, Seattle, Nephrolithiasis with Infection and Surgical Consideration.
Dr. Donald G. Corbett, Spokane, Renal Infections Associated with Congenital Anomalies of the Urinary Tract and Their Surgical Significance.

PENNSYLVANIA

State Medical Election.—Dr. Robert L. Anderson, Pittsburgh, was chosen president-elect of the Medical Society of the State of Pennsylvania at a meeting of the house of delegates in Philadelphia October 7, and Dr. Lewis T. Buckman, Wilkes-Barre, was installed as president of the society. Dr. Walter F. Donaldson, Pittsburgh, continues as secretary. The next annual session will be held in Pittsburgh October 5-8. The 1941 session of the state society was originally scheduled in Pittsburgh October 6-9 but the meeting was canceled because eight of the city's leading hotels were closed by a strike. The house of delegates met in Philadelphia October 6-8 to transact new business and install the officers.

Philadelphia

Physical Standards Under Selective Service Act.—The Philadelphia County Medical Society devoted its meeting, October 20, to a discussion on "Physical Standards Under the Selective Service Act." Major Frank P. Strome, M. C., U. S. Army, retired, professor of military science and tactics, Jefferson Medical College of Philadelphia, presided and the guest speakers were Lieut. Col. Edgar S. Everhart of the Pennsylvania State National Guard, Lemoyne, representing headquarters for Selective Service, Commonwealth of Pennsylvania, and Col. Leonard G. Rowntree, medical director, Selective Service System, Washington, D. C.

Pittsburgh

Hospital News.—Dr. Edward A. Schumann, Philadelphia, was the guest speaker at the annual "West Penn Day" at the Western Pennsylvania Hospital. His subject was "Leaves from a Gynecologist's Notebook."

Society News. — The Allegheny County Medical Society devoted its meeting October 21 to a symposium on the gallbladder, with the following speakers: Drs. Harry R. Decker, Roy R. Snowden, Samuel R. Haythorn and Frank R. Bailey. ——At a meeting of the Pittsburgh Pediatric Society, October 22, Drs. Theodore O. Elterich and Charles F. Elterich spoke on "Pseudohemophilic Diatheses" and Eugene B. Schuster, "Infectious Mononucleosis."

VERMONT

State Medical Meeting and Election.—The one hundred and twenty-seventh annual meeting of the Vermont State Medical Society was held in Burlington, October 2-3. A part of the program was arranged in collaboration with the University of Vermont as a participation in the sesquicentennial celebration of the university. The speakers on the anniversary program were:

Dr. Albert M. Cram, Bridgewater, Early Medical Education in Vermont (presidential address).
Dr. Frank H. Lahey, Boston, President of the American Medical Association, The Diagnosis and Management of Lesions of the Large Intestine.
Dr. Abbott T. Hutchinson, New York, The Mastoid—Some Modifications and Readjustments Toward Better Postoperative Benefits; Also Introducing the Meatal Flap.
Dr. Peer P. Johnson, Beverly, Mass., Acute Pancreatic Disease with an Analysis of Cases.
Dr. George L. Steele, Springfield, Mass., Coronary Failure.
Dr. David M. Bosworth, New York, Herniation of the Intervertebral Disk.
Dr. Kenneth J. Tillotson, Belmont, Mass., The Physiological Approach in the Study and Treatment of Mental Disorders.
Dr. Charles F. Branch, Boston, The Pathology of the Gangrenous Gallbladder.
Dr. Ellice M. Alger, New York, Our Glaucoma Problem.
Dr. Fayette Elmore Hubbard, Montclair, N. J., Anesthesia Hazards.

Guests who addressed other sessions were:

Dr. Louis A. Buie, Rochester, Minn., A Practical Consideration of Anorectal Disease.
Dr. Percy S. Pelouze, Philadelphia, Psychogenic Sensory and Functional Disturbances of the Urinary Bladder.
Dr. Harrison L. McLaughlin, New York, Handling of Complicated Fractures About the Elbow.

Dr. Roland E. McSweeney, Brattleboro, was chosen president-elect and Dr. Ernest H. Buttles, Burlington, became president. Dr. Benjamin F. Cook, Rutland, was reelected secretary.

VIRGINIA

Medical College News.—A new laboratory for pharmacy was dedicated at the opening of the Medical College of Virginia, Richmond, September 15, as a memorial to the late William G. Crockett, Phar.D., professor of pharmacy at the college for many years before his death in 1940. Funds for the memorial, which is in McGuire Hall, were contributed by friends and professional associates of Dr. Crockett.

Changes in Health Officers.—Dr. Samuel D. Sturkie, formerly of Charlottesville, venereal disease control officer of Alexandria and Fairfax County, has been appointed health officer of Smyth County, succeeding Dr. Willard W. Griggs, Marion, who resigned recently to take charge of the health department in Newport News. —— Dr. Henry G. Steinmetz, Arlington, has been placed in charge of the health district incorporating Page, Warren and Shenandoah counties, succeeding Dr. John B. H. Bonner, Luray, who resigned to enter private practice in Elizabeth City, N. C.

WISCONSIN

State Medical Election.—Dr. Francis E. Butler, Menomonie, was chosen president-elect of the State Medical Society of Wisconsin at the annual meeting in Madison, September 10-12, and Dr. Gunnar Gundersen, La Crosse, assumed the presidency. George Larson continues as acting secretary. Next year's meeting will be held in Milwaukee.

Dr. Murphy Named to Chair of Medicine.—Dr. Francis D. Murphy, clinical professor and director of the department of medicine, Marquette University School of Medicine, Milwaukee, has been named to a full professorship in medicine, newspapers reported October 5. The professorship has been endowed by an anonymous donor. Dr. Murphy graduated at Marquette in 1921. He has been clinical director of the Milwaukee County Hospital since 1924 and head of the department of medicine at Marquette since 1928. In 1933 the American Medical Association awarded him a Certificate of Honor for his work on Bright's disease. He is a member of the editorial board of the *American Journal of Digestive Diseases.*

GENERAL

The Poliomyelitis Situation.—Newspapers on October 23 reported that 1 new case in Harford County brought the 1941 total in Maryland to 221 cases, equaling the number reported in 1921. Of the total, 130 are from the counties and 91 from Baltimore City. The worst year in Maryland was 1915, when 333 persons were affected. In Milltown, Wis., schools were ordered closed for twelve days and public gatherings were forbidden to children following an outbreak of poliomyelitis, newspapers reported on October 16.

One Thousand Monkeys for Poliomyelitis Research.—One thousand monkeys from India arrived in Wilmington, Del., October 10, for the National Foundation for Infantile Paralysis, New York, and will be distributed among research groups. All are of the macacus rhesus type. Newspapers reported that these monkeys cost $15 apiece by the time they reach the research laboratory. The foundation recently displayed cages full of 3 week old white mice to which had been successfully transferred the "Armstrong Lansing" strain of poliomyelitis virus and used this demonstration to point out that the cost of this experimental work can now be reduced by using white mice instead of the monkeys, since 100 white mice can be obtained for the price of one monkey and since the cost of their feeding is negligible.

Industrial Hygiene Foundation.—The sixth annual meeting of the Industrial Hygiene Foundation of America, for merly the Air Hygiene Foundation, will be held at the Mellon Institute, Pittsburgh, November 12-13. Included among the speakers will be:

William M. Gafafer, Bethesda, Md., senior statistician, U. S. Public Health Service, First Results of Foundation's Audit of Sick Absences in Industry.

Comdr. Charles S. Stephenson, Washington, D. C., U. S. Navy, Protection of Workers in Wartime.

Dr. Leroy U. Gardner, Saranac Lake, N. Y., Effect of Arc Welding Fumes on Susceptibility to Tuberculosis.

Theodore C. Waters, Baltimore, chairman, Maryland Occupational Diseases Commission, Trends Toward Compensation for Tuberculosis as an Industrial Disease.

Dr. George Baehr, New York, chief medical officer, Office of Civilian Defense, Protection of Civilians and Industry in Wartime.

Philip Drinker, Ch.E., Boston, What's New in Industrial Health—Engineering Developments and Trends.

David P. Morgan, New York, Chemicals & Allied Products Section, Office of Production Management, Impact of Chemical Priorities on Industry and Industrial Health.

Dr. Royd R. Sayers, Washington, D. C., medical director, U. S. Public Health Service, Findings from Major Studies of Fatigue.

Section on Films in Health Education.—A section on films in health education and medicine has been established at the American Film Center, New York, with Dr. Adolf Nichtenhauser in charge. The section, which has received a three year grant from the Rockefeller Foundation, will be a clearing house and information center on the use and production of health education and medical films. According to an announcement, through this section the American Film Center will evaluate existing health films in collaboration with health experts and publish from time to time lists of recommended films. A production program will be developed in collaboration with competent agencies. Since its beginning in 1938, the American Film Center has cooperated with medical and scientific agencies in the study and production of films. The American Film Center is an educational organization, supported by the Rockefeller Foundation. Dr. Nichtenhauser, who has been engaged in educational cinematography for many years, before joining the center was on the staff of the National Tuberculosis Association and of the New York Tuberculosis and Health Association. He graduated at Medizinische Fakultät der Universität, Vienna, Germany, in 1931.

Christmas Seal Campaign.—The National Tuberculosis Association will launch its thirty-fifth annual Christmas Seal sale on Thanksgiving Day, November 20. The association depends on the public's assistance to carry out its year around program for the prevention and cure of tuberculosis. Ninety-five per cent of the total remains in the states in which it is raised, the remaining 5 per cent going to the national headquarters. More than 900 local committees cooperated with the 1,679 tuberculosis associations throughout the country affiliated with the national group. The sum of $5,593,179.13 was reported for the total seal sale for 1939 throughout the United States, Alaska, Puerto Rico, Philippine Islands and Hawaii. Of this total $5,313,520.20 went to the state and local organizations and $279,658.93 was retained by the national association. According to the annual report of the National Tuberculosis Association, replies from four hundred and seventy-five colleges show that two hundred and forty-eight colleges had tuberculosis programs in 1940 while in 1939 there were only one hundred sixty-five. Thirty other colleges reported that they are ready to undertake projects to find tuberculosis on their campuses. A new service was inaugurated in the Indian field in 1940. In July Louisa J. Eskridge joined the field service of the Office of Indian Affairs as assistant supervisor of health education. Her salary is being paid by the national association and the tuberculosis associations of Oregon, Washington and Wyoming.

In 1907, when the first Seal Sale was held, tuberculosis was the leading cause of death. Now it stands seventh in the list of causes of death and second for the Negro population. The death rate in 1930 for tuberculosis among Negroes was 175 per hundred thousand, while in 1938 it was 135, a decrease of 23 per cent.

Postage Stamp in Memory of Grenfell.—Newfoundland will honor the memory of Sir Wilfred Grenfell, St. Anthony, Newfoundland, and Charlotte, Vt., with the release about December 1 of a 5 cent stamp to commemorate his humanitarian work among the natives of Labrador and Northern Newfoundland. According to the New York *Times*, the design will picture Sir Wilfred on his hospital steamer *Strathcona* II with an iceberg in the background. Dr. Grenfell was born in England in 1865. After a period as house physician at London Hospital, he organized a hospital service for the fisheries of the North Sea and cruised with fishermen from the Bay of Biscay to Iceland, establishing homes for them and providing mission services at sea. In 1892 he went to Newfoundland on a small boat carrying hospital supplies. The following winter the governor of Newfoundland invited Dr. Grenfell to take up regular work along the Labrador coast. He established a hospital and later the International Grenfell Association, which by 1927 had six hospitals, seven nursing stations, four hospital ships, four orphanage boarding schools, fourteen industrial centers, three agricultural stations, twelve clothing distribution centers, a supply schooner and a lumber mill. His headquarters was at St. Anthony and he remained there until 1934. Dr. Grenfell served in the World War as a major in charge of the medical unit sent by Harvard University. He wrote many books about Labrador. Dr. Grenfell died at his home in Charlotte, Vt., Oct. 9, 1940, at the age of 75.

CANADA

Report on Poliomyelitis.—Newspapers reported on October 21 that the poliomyelitis epidemic prevalent in Fredericton appears to be at an end. Only 1 case of the disease had been reported in the previous twenty-four hours, bringing the total number of cases in the province to 363. Altogether sixteen deaths had been recorded in the outbreak.

Foreign Letters

LONDON

(From Our Regular Correspondent)

Sept. 20, 1941.

Changes in the Pharmacopeia

The fourth addendum to the British Pharmacopeia, the third published during the war, has appeared. The object of the Pharmacopeia Commission has been to recognize new preparations which war experience has brought to light and to make changes in the interests of economy without creating difficulties. New descriptions of and standards for certain chemicals formerly supplied only as proprietary preparations, several of which were imported from Germany, are given. Among them are sulfanilamide; suramin, which replaces "Bayer 205" used in the treatment of trypanosomiasis, and pamaquin, which replaces the proprietary "plasmoquin." Digoxin, a proprietary prepared from digitalis lanata, still covered by patents, is included. This is relaxation of the practice of excluding articles for which a monopoly exists. Absence of ordinary sources brought about by the war account for some changes. Indian squill takes the place of Mediterranean squill. The test of halibut liver oil has been altered to admit oils from the Pacific Coast. A synthetic optically inactive menthol is introduced because of lack of the natural menthol imported from Japan and of the synthetic product from Germany. Mandelic and nicotinic acids, benzyl benzoate (now much used for the treatment of scabies), bismuth subgallate (an antiseptic dusting powder known as "dermatol"), ephedrine (of which the hydrochloride has been in the pharmacopeia) for the making of oily preparations and light liquid paraffin (for sprays) have been added. Proflavine is introduced because of preference over acriflavine.

There are some changes in pharmaceutical procedure. Tyndallization (sterilizing by intermittent heating) has been found unreliable in dealing with infective spores. The method now adopted is heating at 98-100 C. in the presence of a bactericide. Bactericides specified are chlorocresol 0.2 per cent or phenylmercuric nitrate 0.002 per cent. There are new preparations for injections—procaine and epinephrine, 2 per cent, sodium morrhuate, and quinine and urethane. They must be sterilized with chlorocresol. Sodium hydroxide is introduced because of the difficulty of obtaining the potassium compound. Morphine sulfate is the salt most commonly used for hypodermic injection, the tartrate having gone out of use. Glycerin is excluded as far as possible; glycerite of tannic acid may now contain no glycerin; tannic acid is dissolved in distilled water and thickened with tragacanth. Potable water is recognized instead of distilled water for a number of preparations, such as aromatic waters. This is a measure of economy.

The Food Situation

The food minister, Lord Woolton, states that we have all the essential food we require. After nearly two years of war there is no sign of shortage or malnutrition. But there are restrictions of many foods, particularly of meat, butter and milk. In the coming winter adults will get less milk in order that children may get more. The position as to fats is now secure, thanks to help from America. It was because of lack of fats that Germany broke in the last war. "As to meat," the minister says, "everyone wants more, but I can't do it. If I get a surplus I shall not give it to the ordinary folk; it will go to places where it is needed most—to the mines and industrial plants." The ration of meat is only 24 cents per week and a pound of beef or mutton costs 36 cents. However, the highly nutritious offals, fish and poultry are not rationed. There is an ample supply of cereals and a greater number of people are learning the value of foods made from the whole grain.

"Schering" Now Entirely British

In a previous letter to The Journal the conversion of the branch in England of the great German chemical firm of Schering into a British firm was reported. Some further details can now be given. All the German Schering interests in this country have been acquired by a British group which comprises three companies: British Schering, Ltd., British Schering Research Laboratories, Ltd., and British Schering Manufacturing Laboratories, Ltd., each complementary to the other. Existing Schering products will be made by British Schering Manufacturing Laboratories, Ltd. Research will be developed henceforth by British Schering Research Laboratories, Ltd., of which Dr. D. H. Hey, of the department of organic chemistry, Imperial College of Science and Technology, has been appointed director. Existing Schering products will be made by British Schering Manufacturing Laboratories, Ltd. The necessary patents having been acquired and preparations hitherto sold in this country will, after the present stocks are exhausted, be of British manufacture. The entire personnel of all three companies is British born and the financial interest is wholly British.

Medical Help for Russia

The prime minister has asked Sir Charles Wilson, president of the Royal College of Physicians, to join the British mission to Moscow in order to report to him on any medical help that should be given to Russia.

SWITZERLAND

(From Our Regular Correspondent)

Aug. 15, 1941.

Scientific Research in Switzerland

Dr. Paul Karrer, professor of chemistry in Zurich, recently discussed scientific research, which has assumed great significance for Switzerland because of the greater need of substitutes. Switzerland's scientific leadership in a number of industrial fields has been imperiled of late by the fact that scientific research in Switzerland is supported neither by the state nor by individuals to the extent as is done abroad. A hundred years ago the founding of Swiss universities entailed financial sacrifices. Nothing at present is being done that is in any wise comparable. Not only the larger countries but also the smaller ones have set up research bureaus and provided maintenance funds, thus mobilizing creative production. Swiss universities are obliged to work with very modest funds.

Hospital Facilities for the Canton of Zurich

The new hospital facilities for the canton of Zurich, long under discussion, now await execution. The general plan includes a medical clinic, a medical polyclinic, a surgical clinic, a radiologic institute, an institute of physical therapies, an otorhinolaryngologic clinic, a clinic for nervous diseases, a psychiatric polyclinic, an accident division, an eye clinic, a cantonal dispensary and a pathologic institute. The construction costs will amount to 48,800,000 francs. The land to be used is situated along the Zurich mountain, where university buildings already exist. The medical and surgical clinics will be housed in a six story building and contain four hundred and eighty-five beds. The medical polyclinic and the special clinics will have two hundred and seven beds at their disposal. Construction will be spread out over six years.

Experimental Phosgene Poisoning

Prof. E. Rothlin reported to the medical society of Basel the results of experiments on rats with phosgene intoxications. Phosgene belongs to the so-called green cross war gases. These experiments indicate that calcium therapy must be instituted promptly and applied in quite large doses. In investigations conducted during the World War Heubner, Magnus and others stated that the lungs constitute a barrier to phosgene. Ross,

however, of the medical clinic of Basel, had expressed a different view in 1913. He had based his conclusions on observations of 2 cases of occupational phosgene poisoning. Rothlin's experiments seem to indicate that the lungs do not constitute such a barrier. A component of the central nervous system must be assumed to be the cause of pulmonary edema, as well as a pulmonary reflex with the vagus and the sympathetic. Rothlin's investigations also showed that phosgene is not so easily neutralized in water as was previously assumed.

Population Statistics for 1939

The declining birth rate in Switzerland has not yet come to a halt. Statistics for 1939 show that the birth rate exceeded the death rate by only 3.4 per thousand inhabitants (1938, 3.6; 1937, 3.7; 1936, 4.2; 1930, 5.6; 1920, 6.5; 1910, 9.9; 1902, 11.5). The difference between the birth rate in 1939 and the highest on record (1902) was 8.1. In the last seven decades very low levels were recorded only twice, owing to an abnormally high mortality, namely in 1871 (1.4) and 1918 (0.6). The average figures for birth excess and death rate show that the declining birth rate was accompanied by a steadily decreasing mortality. The death rate seems to have attained its lowest record in 1934 and 1937 with 11.3. The mortality rate rose in 1938 and 1939 to 11.6 and 11.8 respectively.

The number of marriages contracted had no significant influence on the birth rate. Since 1871, with a few exceptions, the number of marriages showed upward and downward variations per thousand inhabitants, fluctuating between 6.8 and 7.9 (1931-1935, 7.7; 1936-1939, 7.3; 1939, 7.5). Likewise the average marriage age of single men and women, which had risen from 28.5 to 28.9 for men and from 26.1 to 26.7 for women, was scarcely of any importance. However, a connection does exist between birth rate and urban population. The four large cities, totaling 741,900 inhabitants in 1939, showed the following ratios between marriages, live births, deaths and birth excess: 10.3, 11.1, 10.3 and 0.8. Communities averaging a 5,000 and a 10,000 population and totaling 418,150 inhabitants showed the following ratios: 6.9, 14.1, 11.6 and 2.5 of birth excess. Communities under 5,000, totaling 2,405,650 registered inhabitants, showed similar ratios of 6.5, 17.4, 12.3 and a 5.1 excess of births over deaths. These figures indicate that the smaller the town, the smaller the number of marriages, but the larger the birth rate, the mortality rate and the excess of births over deaths.

BUCHAREST

(From Our Regular Correspondent)

Sept. 8, 1941.

The Treatment of Scabies at the Front

The medical authorities of the Rumanian army have adopted the Danish method of treating scabies. The advantages attached to this method are: 1. It is easy of application. 2. A single inunction suffices. 3. Cutaneous irritation is slight. 4. After twenty-four hours the scabies is cured. The average cost of the ointment for an adult is 180 to 200 lei—approximately 80 to 85 cents. The principle of treatment lies in the production of sulfureted hydrogen when the ointment is placed on the skin. An excess of alkalinity must be avoided in the preparation of the ointment, which should be smeared on and not rubbed into the skin. Captain Fagaraseanu treated 198 patients with scabies by this method, with only 5 failures (due to not following the directions given), and with the development of 3 cases of dermatitis when the treatment had been used continuously for four to five days.

Precaution Against Air Raids

The Ministry of Public Health has made far reaching arrangements for protection against air raids and gas attacks. A circular has been sent to public health inspectors ordering them to give lectures on how to make air shelters, how to build new houses to make them bomb proof, how to equip existing houses with the necessary equipment prescribed by the War Ministry and how to use gas masks. Such lectures and courses already have been held several times. Special committees have been appointed in each municipality to visit all houses and decide whether the basements and cellars render satisfactory protection and are gas proof and to advise how to render them safe. The same committee has to supervise the plans of new buildings, which must be provided with gas-proof basements, having accommodations for all the tenants. Landlords who are short of the means to make extensive and expensive transformations on their houses to answer to the requirements of air raid precautions obtain corresponding loans from the state; they pay no interest whatever and have the option to repay the loan in instalments extending to fifteen years.

Cardiac Complications of Influenza

From experience gained during epidemics in Rumania in the last ten years, Dr. I. G. Popescu lectured before the medical society on the cardiac complications of influenza. Cardiac influenza may be manifested by endocarditis, pericarditis, bradycardia, arrhythmia and cardiac neuralgia. Most of the cases occur between the ages of 20 and 40 years. The influenza virus may arouse old lesions into fresh activity, create new lesions and upset the cardiac equilibrium by affecting the nervous system. The prognosis is grave, especially when there is an organic lesion of the heart. Sudden death is not uncommon, and complications such as embolism, pyemia, cardiac failure and collapse may occur. Popescu said that mental disorders following influenza were met only in exceptional cases. Most of these developed at the end of the febrile stage during the period of asthenia and showed a more or less confusional type of psychosis, the symptoms being most pronounced in those with a psychopathic history. In a few cases the most conspicuous feature was pronounced amnesia. In almost all the cases improvement in the mental condition coincided with improvement in the general physical state of health.

Marriages

HAROLD ERVIN STADLER, 1st Lieutenant, Medical Reserve Corps, United States Army, Fort Benjamin Harrison, Ind., to Miss Doris Jane Goldsmith of Indianapolis, September 14.

JOHN H. SHAMEL, Ashkum, Ill., to Miss Frances Lee Richeson of Chillicothe, Mo., at Canton, Mo., August 10.

DAVID ALEXANDER WILSON, Dover, Del., to Miss Ruth Brinkley Alexander in Durham, N. C., in October.

DONALD O. MANSHARDT, Chicago, to Miss Betty Schilling of Bippus, Ind., at La Porte, Ind., September 6.

JOE HUMPHREYS, Indianapolis, to Miss Genevene Gohring of Rushville, Ind., at Indianapolis, August 10.

ARTHUR AARON DERRICK JR. to Miss Sidney Ella Shrock, both of Goodman, Miss., in Jackson, July 18.

JOHN CALVIN GRIER JR., Charlotte, N. C., to Miss Alice May Donaldson in Fort Worth, Texas, July 24.

WALTER ROLFE NEWBERN, Fort Benning, Ga., to Miss Shirley Stimpson of Statesville, N. C., October 4.

GEORGE DEAN JOHNSON to Miss Elizabeth Brown Heath, both of Spartanburg, S. C., October 11.

ROBERT N. KABEL, Winchester, Ind., to Miss Virginiabelle Acker of New Castle, September 6.

WILLIAM THOMAS PUGH, Lynchburg, Va., to Miss Frances Kendig of Kenbridge, August 16.

HYMAN WARNER GELLER, Atlanta, Ga., to Miss Sylvia Jaffe of Hempstead, N. Y., August 17.

FRANK ROBERT BONDI, McKeesport, Pa., to Miss Dorothy Ann Dunn of Greenock, July 7.

MARSHALL R. LOUIS, Auburn, N. Y., to Miss Louise Stern of Rochester, October 19.

WILLIAM M. HOWDON, Miami, Fla., to Miss Arline Kaye of Miami Beach, July 19.

Deaths

Max Brödel, recognized as founder of the art of medical illustration in the United States, associate professor of art as applied to medicine at the Johns Hopkins University School of Medicine, Baltimore, died October 26, aged 71. He was born at Leipzig, Germany, June 8, 1870 and was educated at the Academy of Fine Arts at Leipzig and at the University of Leipzig. Early in his career he became associated with Karl Ludwig, noted physiologist, and served as medical illustrator of anatomy and physiology at the University of Leipzig until 1893. In 1888 he met Franklin P. Mall when the latter was working in Leipzig. Then in 1894, at the suggestion of Mall, Max Brödel came to Baltimore to make illustrations for the book on gynecology written by Dr. Howard A. Kelly. Since that time he has illustrated many notable works in the field of medicine, including particularly the writings of members of the Johns Hopkins faculty — Halsted, Cullen and many others. In 1910 gifts made to Johns Hopkins University by Mr. Henry Walters enabled the continuation of the work of Brödel in that institution, and in 1920 an endowment fund of more than $100,000 was established for the maintenance of the department of anatomic art. In THE JOURNAL, August 30, page 668, appears the final literary contribution of Max Brödel on the field of medical art as an occupation. In 1938 physicians from the entire country attended a banquet in honor of Max Brödel, at which his portrait, painted by Thomas Corner, was presented to Johns Hopkins University. The many pupils of Max Brödel now teach and work in leading medical colleges and clinics throughout the United States.

MAX BRÖDEL 1870-1941

George Washington Hall ✠ Chicago; Rush Medical College, Chicago, 1893; Chairman of the Section on Nervous and Mental Diseases of the American Medical Association, 1929-1930; at one time vice president of the American Medical Golfing Association; instructor in laryngology and diseases of the chest from 1895 to 1901, instructor in materia medica and therapeutics, 1902, instructor in medicine from 1903 to 1905, assistant professor from 1906 to 1910, associate professor of nervous and mental diseases from 1911 to 1924 and clinical professor of neurology since 1925 at his alma mater; member of the American Neurological Association and the Association for Research in Nervous and Mental Diseases; past president of the Central Neuropsychiatric Association; fellow of the American College of Physicians; attending physician, Cook County Hospital, from 1908 to 1912 and attending neurologist from 1913 to 1926; on the staff of the Cook County Psychopathic Hospital from 1918 to 1930; attending neurologist, St. Luke's Hospital since 1916; aged 72; died, October 25, of coronary thrombosis, while attending the meeting of the Central Neuropsychiatric Association in Detroit.

Francis Wayles Shine ✠ Charlottesville, Va.; University of Virginia Department of Medicine, Charlottesville, 1898; member of the Medical Society of the State of New York, American Academy of Ophthalmology and Otolaryngology, American Ophthalmological Society and the Association for Research in Ophthalmology, Inc.; past president of the New York Ophthalmological Society; served during the World War; served at various times and in various capacities on the staffs of the New York Eye and Ear Infirmary, Doctors Hospital and the New York Hospital, New York; aged 67; died, September 24, in the University of Virginia Hospital of myocarditis, hypertension and arteriosclerosis.

Forest Henry Staley, St. Louis; Washington University School of Medicine, St. Louis, 1918; member of the Missouri State Medical Association; fellow of the American College of Surgeons; assistant in surgery at his alma mater from 1917 to 1921, assistant in anatomy from 1921 to 1923 and instructor in anatomy, 1923-1924; instructor in surgery, St. Louis University School of Medicine from 1924 to 1929, senior instructor in surgery from 1929 to 1941 and since 1941 assistant professor of surgery; assistant surgeon, St. Mary's Group of Hospitals from 1924 to 1941 and since 1941 associate surgeon; aged 56; died, September 21, in the Firmin Desloge Hospital of subacute bacterial endocarditis.

George Albert Traylor ✠ Augusta, Ga.; University of Georgia Medical Department, Augusta, 1904; associate professor of gynecology at his alma mater from 1919 to 1924 and professor of clinical surgery since 1924; member of the Southeastern Surgical Congress; fellow of the American College of Surgeons; past president of the Medical Association of Georgia; served during the World War; at one time chairman and for many years member of the county board of health; on the staffs of the University Hospital and the Wilhenford Hospital for Women and Children; aged 61; died, September 15, of coronary occlusion.

Jacobo Fajardo y Puno, Manila, Philippine Islands; University of Santo Tomas College of Medicine and Surgery, Manila, 1905; past president of the Philippine Public Health Association; formerly executive health officer of Philippine Islands and director of health, Philippine Health Service; served as chief health officer in the health department of Mindanao and Sulu and as a member of the Philippine legislature; president of the Manila Medical Society in 1926; aged 65; died, July 23, at the Johns Hopkins Hospital, Baltimore, of pneumonia following an operation.

Francis Goodwin Du Bose ✠ Maplesville, Ala.; Medical Department of Tulane University of Louisiana, New Orleans, 1893; member of the Southern Surgical Association; fellow of the American College of Surgeons; past president of the Alabama Hospital Association; consulting surgeon for the Marion Military Institute and member of the Alabama State Board of Examiners for Nurses; formerly chief of staff of the Vaughan Memorial Hospital, Selma; aged 68; died, October 1, of coronary occlusion.

Henry King McHarg Stephens, New York; Emory University School of Medicine, Atlanta, Ga., 1926; member of the Medical Society of the State of New York and the American Academy of Dermatology and Syphilology; on the staffs of the Bellevue Hospital and St. Vincent's Hospital; aged 39; died, September 25, of cerebral hemorrhage.

Alexander Stedman Wilson, Tampa, Fla.; Rush Medical College, Chicago, 1896; from 1896 to 1926 served as a medical missionary in India; medical officer in the British Army Reserves in India during the World War; aged 69; died, September 13, in the Walter Reed General Hospital, Washington, D. C., of coronary thrombosis.

Samuel Saffell Bogle ✠ Santa Rosa, Calif.; University of Tennessee Medical Department, Nashville, 1891; district surgeon of the Northwestern Pacific Railroad for many years; formerly superintendent of the Sonoma County Hospital; aged 74; died, September 27, in the Southern Pacific General Hospital, San Francisco, of aplastic anemia.

Charles Roe Marney, Tampa, Fla.; Atlanta (Ga.) College of Physicians and Surgeons, 1913; member of the Florida Medical Association; past president of the Hillsborough County Medical Society; served during the World War; aged 59; on the staff of the Municipal Hospital, where he died, September 17 of mesenteric thrombosis.

Leroy Worth Kuser ✠ Gainesville, Texas; Baylor University College of Medicine, Dallas, 1913; past president of the Cooke County Medical Society; formerly member of the school board; on the staff and for many years secretary-treasurer of the Gainesville Sanitarium; aged 65; died in September at Santa Fe, N. M.

Ira Edgar Freyman, Weatherly, Pa.; Medico-Chirurgical College of Philadelphia, 1907; member of the Medical Society of the State of Pennsylvania; served during the World War; formerly member of the board of health of Weatherly; aged 61; died, September 19, at Philadelphia of coronary occlusion and arteriosclerosis.

John Webster McGehee ✠ Reidsville, N. C.; University of Maryland School of Medicine, Baltimore, 1904; past president of the Rockingham County Medical Society; bank president; on the staff of the Memorial Hospital; medical examiner for the local draft board; aged 61; died, September 23, of coronary occlusion.

Henry Anthony Strecker ✠ Philadelphia; Jefferson Medical College of Philadelphia, 1894; served as assistant chief medical inspector from 1909 to 1923 and as medical director in charge of private schools from 1923 to 1931; for many years on the staff of the Jefferson Hospital; aged 69; died, September 30.

George Dawson Walker, Johnston, S. C.; Atlanta (Ga.) College of Physicians and Surgeons, 1905; member of the South Carolina Medical Association; member of the board of health;

aged 62; died, September 28, in the South Carolina Baptist Hospital, Columbia, of cerebral embolus and carcinoma of the left lung.

George Loring Tobey Sr., Bremen, Maine; Medical School of Maine, Brunswick, 1879; member of the Massachusetts Medical Society; member of the selective board during the World War; formerly on the staff of the Clinton (Mass.) Hospital; aged 88; died, September 18, of coronary thrombosis.

Herbert Cholerton ✠ Somerville, Mass.; Harvard Medical School, Boston, 1901; member of the New England Obstetrical and Gynecological Society; formerly chairman of the school committee; aged 68; on the staff of the Somerville Hospital; died, September 25, of lymphoblastoma of the mediastinum.

Archibald McNeil, Westport, Conn.; Dartmouth Medical School, Hanover, N. H., 1896; at one time professor of bacteriology at the New York Medical College and Flower Hospital; aged 75; died, October 13, in the Norwalk (Conn.) General Hospital of ruptured esophageal varix.

William Milton Wallace, Johnstown, Pa.; Cleveland Homeopathic Medical College, 1904; member of the Medical Society of the State of Pennsylvania; aged 63; died, September 23, in the Mercy Hospital of a blood stream infection complicated with acute endocarditis.

George Russell Curl, Chicago; Eclectic Medical College, Cincinnati, 1910; member of the Illinois State Medical Society; served during the World War; aged 57; formerly on the staff of the Veterans Administration Facility, Hines, where he died, October 8, of cerebral hemorrhage.

William Reed Dickson ✠ McDonald, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1893; past president of the Washington County Medical Society; served during the World War; member and past president of the school board; aged 73; died, September 28.

Willis R. Moss ✠ Clinton, Ky.; University of Louisville Medical Department, 1893; president of the Hickman County Medical Society; past president of the board of health of Hickman County; aged 73; died, September 21, at the Baptist Hospital, Memphis, Tenn.

Oscar Luna Smith, Atlanta, Texas; Gate City Medical College, Texarkana, Ark., 1906; member of the State Medical Association of Texas; aged 57; was found dead, September 9, in the North Louisiana Sanitarium, Shreveport, La., of acute dilatation of the heart.

Howard Jesse Wright, Des Moines, Iowa; Drake University Medical Department, Des Moines, 1901; formerly county coroner; served during the World War; aged 70; died, September 31, of injuries received in an automobile accident near Columbia, Mo.

William Andrew Henneger, Dubuque, Iowa; State University of Iowa College of Medicine, Iowa City, 1908; member of the Iowa State Medical Society; served during the World War; aged 54; died, September 12, in St. Joseph Sanitarium of heart disease.

Albert Thomas Martin ✠ Huntington Park, Calif.; Johann Wolfgang Goethe-Universität Medizinische Fakultät, Frankfurt-am-Main, Prussia, 1922; member of the Radiological Society of North America, Inc.; aged 42; died in September.

Cedric Hughes Archibald, Ottawa, Ont., Canada; University of Toronto Faculty of Medicine, 1918; served during the World War; assistant psychiatrist in the Pensions and National Health Department; aged 47; died, September 5.

Carlo B. Marcum, Berea, Ky.; University of Louisville Medical Department, 1914; member of the Kentucky State Medical Association; on the staff of the Berea College Hospital; aged 52; died, September 20, of coronary occlusion.

Charles Edney Burnham, Bay Springs, Miss.; Medical Department of Tulane University of Louisiana, New Orleans, 1900; member of the Mississippi State Medical Association; formerly county health officer; aged 70; died, October 1.

Frank Edward Toole ✠ New Haven, Conn.; Yale University Medical School, New Haven, 1919; aged 49; on the staffs of the Grace Hospital and the Hospital of St. Raphael, where he died, September 24, of coronary thrombosis.

Arthur Clifton Branch, Glennville, Ga.; Medical Department of Tulane University of Louisiana, New Orleans, 1910; member of the Medical Association of Georgia; aged 58; died, September 30, in Jesup following an appendectomy.

Ptolemy P. Chambers, Holly Hill, Fla.; Medical College of the State of South Carolina, Charleston, 1907; aged 57; died, September 27, in the Warren A. Candler Hospital, Savannah, Ga., of carcinoma of the neck, jaw and face.

John A. Stevens, Aliquippa, Pa.; Jefferson Medical College of Philadelphia, 1908; member of the Medical Society of the State of Pennsylvania; formerly county medical director; aged 59; died, September 21, of coronary occlusion.

Charles Edward Marquis, Oakland, Calif.; Washington University School of Medicine, St. Louis, 1923; aged 47; died, September 12, in the Peralta Hospital of gastric hemorrhage and hypertrophic cirrhosis of the liver.

Patrick Francis Kelleher ✠ Cambridge, Mass.; Tufts College Medical School, Boston, 1896; formerly on the staffs of St. Elizabeth's Hospital, Boston, and Cambridge City Hospital; aged 73; died, September 25.

Edward Gilbert Trowbridge, Chicago; Bennett College of Eclectic Medicine and Surgery, Chicago, 1897; aged 86; died, September 29, in the Evanston (Ill.) Hospital of arteriosclerosis, and auricular fibrillation.

Gertrude Taft, Los Angeles; University of Southern California College of Medicine, Los Angeles, 1893; formerly a medical missionary in China; aged 75; died, September 10, of heart disease and arteriosclerosis.

Amerida M. Gross ✠ Hazard, Ky.; Hospital College of Medicine, Louisville, 1905; at one time county judge and sheriff; aged 61; died, September 29, in the Hazard Hospital of malignant hypertension.

James Mitchell Doughty, Tucumcari, N. M.; Chattanooga (Tenn.) Medical College, 1904; formerly member of the state board of medical examiners; aged 63; died, September 30, of cerebral arteriosclerosis.

Jacob Cicero Warmack ✠ Oklahoma City; Gate City Medical College, Texarkana, Ark., 1907; at one time on the staff of Wesley Hospital; aged 71; died, September 26, of coronary occlusion.

John M. Price, Tifton, Ga.; University of Georgia Medical Department, Augusta, 1886; aged 83; died, September 18, in a hospital at Waycross of acute dilatation of the heart.

Elgin Howard Shildrick, Cleveland; University of Wooster Medical Department, Cleveland, 1896; aged 72; died, September 1, of coronary artery disease.

William Coleman Norris, Quitman, Miss.; Mississippi Medical College, Meridian, 1908; served during the World War; aged 59; died, September 10.

Martin Lee Wilbanks ✠ Greenville, Texas; Barnes Medical College, St. Louis, 1902; aged 67; died, September 21, in Leonard, of coronary thrombosis.

James Henry Smoot, Woodstock, Va.; University of Maryland School of Medicine, Baltimore, 1892; aged 74; died, September 25, of tuberculosis.

Percy Kaufman Heller, Rochester, Pa.; University of Pittsburgh School of Medicine, 1908; aged 55; died, July 24, at Coatesville, of hemiplegia.

Charles Hurlburt Burritt, Claremont, Calif.; McGill University Faculty of Medicine, Montreal, Que., Canada, 1890; aged 77; died, September 20.

George Calhoun Pruitt, Atlanta, Ga.; Atlanta College of Physicians and Surgeons, 1911; aged 54; died, September 26, of coronary arteriosclerosis.

Carroll Hotchkiss Browning ✠ Oberlin, Ohio; Western Reserve University Medical Department, Cleveland, 1925; aged 41; died, September 30.

Lorena Welbourne-Shelley, Steelton, Pa.; Woman's Medical College of Pennsylvania, Philadelphia, 1924; aged 46; died, September 7.

Walter P. King, Shaw, Miss. (licensed in Tennessee in 1903); also a minister; aged 77; was killed by a freight train in September.

Alexander Smith McCaig, Sault Ste. Marie, Ont., Canada; University of Toronto Faculty of Medicine, 1896; aged 60; died, July 3.

Herman Schwartz, New York; University and Bellevue Hospital Medical College, New York, 1903; aged 65; died, August 20.

John Dougal McGregor, El Paso, Texas; Bellevue Hospital Medical College, New York, 1882; aged 82; died, August 26.

James H. Bute, Houston, Texas; Georgetown University School of Medicine, Washington, D. C., 1899; aged 62; died, August 28.

Emily H. Selby ✠ Chicago; Harvey Medical College, Chicago, 1901; aged 80; died, September 9, in the Presbyterian Hospital.

Otto Grismore, Steubenville, Ohio; Eclectic Medical Institute, Cincinnati, 1903; aged 62; was found dead, September 9.

Jalmar Melvin Hofto ✠ Grand Forks, N. D.; Rush Medical College, Chicago, 1924; aged 44; died, August 26.

Bureau of Investigation

POST OFFICE DEPARTMENT TURNS OFF SOME LIGHTS

Ever since George Starr White issued his first bit of nonsense about the therapeutic effect of colors there has been a more or less continuous promotion of color therapy by those who dabble in pseudomedicine. Previous articles in THE JOURNAL dealing with the use of color therapy include the following:

"Spectro-Chrome Therapy" (Dinshah P. Ghadiali), Jan. 6, 1924, page 321.
"George Starr White—Quack," April 13, 1929, page 1292.
"The 'Spectro-Chrome' and 'Hocus-Pocus'" (Dinshah P. Ghadiali and E. A. Ernest), Aug. 1, 1936, page 362.
"Chromoray—Trioray" (Dinshah P. Ghadiali, E. A. Ernest, George Starr White and Karl von Schilling), Oct. 15. 1938, page 1490.

In 1941 the Post Office Department at Washington issued two fraud orders against persons and concerns which exploited the color therapy buncombe and in each case found it necessary to extend the fraud order to cover certain new names they were discovered to be using as evasions.

E. A. ERNEST AND THE ERNEST DISTRIBUTING COMPANY, MILWAUKEE

Ernest is the person mentioned in two of the titles listed. The 1938 article discussed at length the hokum that Ernest employed in promoting his two devices "Chromoray" and "Trioray" in the field of so-called color therapy. Further, it pointed out that Ernest's concern had at different times represented itself as distributor for Karl von Schilling's "Vita Chrome (Life Colors)" device and Dinshah P. Ghadiali's "Spectro-Chrome Therapy" machine. Eventually he broke off these connections to go into the same field on his own. As the article commented, "If one is in the hocus-pocus business, why split the swag?"

In due time the Post Office Department began to look into Ernest's scheme of selling through the mails his "Trioray" (colored hand lenses) and his other device, a color lamp which had come to be known by the hyphenated title "Chromoray-Focoray." The investigation developed the facts that Ernest, who claimed to have taken a correspondence course in civil engineering and also displayed a diploma issued by the "National College of Electro-Therapeutics," had been in the ornamental bronze business from 1902 to 1929; that some time after discontinuing it he got possession of a book, "The Principles of Light and Color," by Edwin D. Babbitt (which was published in 1878 but is said to have no standing among authorities on physical therapy) and that in 1933 Ernest commenced his color-light business. It was further shown that Ernest was promoting his devices by false and fraudulent pretenses, representations and promises, such as that when used as directed they would emit color rays which would prevent or cure "practically every known disorder," including, among others, appendicitis, arthritis, asthma, cancer, cataract, diabetes, pneumonia, prostatic troubles, rheumatism, rupture, sleeping sickness, tuberculosis, venereal diseases and bubonic plague! It is not surprising that Ernest did not put up a defense in this case and that the Post Office issued a fraud order dated March 17, 1941 debarring the further use of the mails to E. A. Ernest and the Ernest Distributing Company.

Less than two months later, however, the Post Office discovered that Ernest was continuing his fraudulent business under a new trade style, Ernest Short Wave Company. A letter addressed to that name at Milwaukee brought a reply offering for sale not only a so-called short wave device but also the "Chromoray-Focoray" and "Trioray." Although this communication was sent on the letterhead of the Ernest Distributing Company there was added to this title as a precaution the stamped notation "Make payments and address all communications to Ernest Short Wave Co." As this scheme was obviously an evasion of the fraud order issued against Ernest two months earlier, the Post Office, on June 12, 1941, extended that order to cover the names of Ernest Distributing Company and its officers and agents, including E. A. Ernest himself.

ERNEST J. STEVENS

For many years this person has been doing business chiefly from San Francisco. As long ago as 1920 his letterhead gave that city and Philadelphia as his addresses and played up the "Stevens Health Inventions Company" with the subhead "E. J. Stevens, M.S., Inventor." The list of his devices then included "Nebulizers (3 Styles), Balsam Bath Inhalants, Balsam Inhaling Masks (2 Styles), Semi-automatic Air Pumps (2 Styles), Internal Bath Outfit (Colon and Vaginal), Balsam Vaporizer (Pocket Size), Physicians' Balsam Vaporizer (Pocket Size), Electric Light Bath Cabinets" and "Electric, Steam and Hot Air Outfits, Hydro, Color and Light Therapy, Vibratory and Massage Outfits." The same letterhead also bore the name "Stevens Light & Color Institute," and the letter, addressed to a physician, offered to "sell, rent or exchange, for office or home use, electric light bath cabinets, the light and color applicators and arm and leg baking outfits. We also supply therapeutic lamps and violet rays and chair vibrators, etc."

It was, of course, to the "drugless healers" that Stevens made his principal appeal. A clipping credited to the Spokane, Wash., *Review*, July 27, 1924, reported that "E. J. Stevens, of the

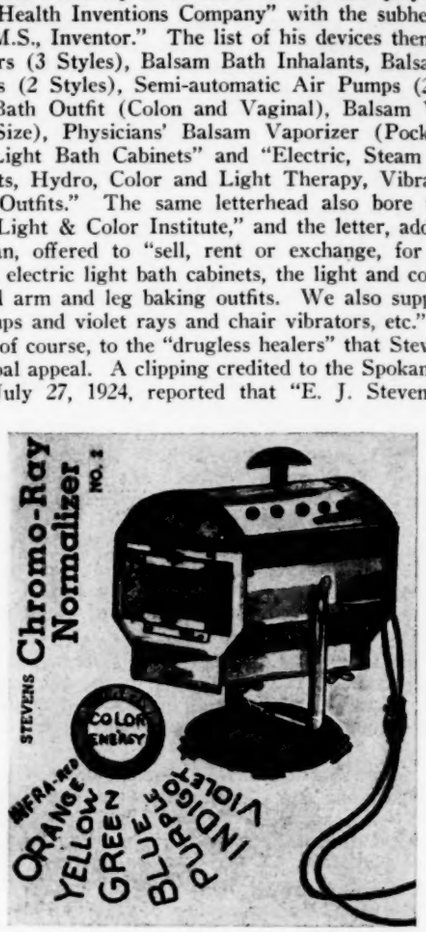


Illustration from Stevens' advertising.

Stevens Light and Color Laboratories" would be "the chief speaker" at the gathering of the "Washington State Association of Sanipractic Physicians" in Seattle in the following September. Further, Ernest J. Stevens of San Francisco was named as a member of the "Educational Board and Research Department" on the letterhead sent out in March 1924 by the "American Raw Food, Health and Psychological Clubs." The president of this outfit was St. Louis Estes, who once proclaimed himself "The World's Greatest Health Scientist, Psychologist, and International Authority on Old Age, Raw Foods, and Dynamic Oxygenation—The Man who Rebuilt Himself—Old at Thirty, Young at Fifty—Father and Founder of the Raw Food Movement." Obviously not an introvert.

Stevens himself dabbled in many types of quackery. In various health fad magazines there appeared "keyed" advertisements from addresses Stevens used, in which he varied his initials (using "E. N.," "E. H.," for example) or his firm names, and played up his "Nulife, Sex and Diet," "Nature Method Cures" for "Catarrh, Asthma and Lung Trouble," "Science of Colors and Rhythms, etc." and "Vital Sex and Love Facts (Rare Secrets Revealed)."

One of Stevens' freak projects was "The Stevens Occult and Astral Anatomical Human Temple Chart" which, take his word for it, was the "Essence of the Wisdom of Ages." In June 1936 he was listed as "President" on a letterhead of the "Meta Collegiate Extension of the National Electronic Institute, Inc.," at Sparks, Nev., which solicited physicians to take its correspondence courses and become "professional analysts" and "human engineers."

Finally Stevens, like Ernest, came under the scrutiny of the Post Office Department, and a fraud order was issued May 17,

1941 against a long list of trade styles under which he operated. Among these were Stevens Helio-Scientific Company, Rainbow Publishers, E. J. Stevens Publishing Company and the E. J. Stevens Color Institute. According to the government's memorandum on this case, Stevens appeared at the hearing and testified in his own behalf but did not produce any other witness or documentary or scientific evidence. The Post Office presented a number of authorities in the fields of bacteriology and physical therapy who testified as to the worthlessness of the defendant's color ray lamp (variously called "Stevens Helio-Chromo-Energizer," "Stevens Chromo-Ray Normalizer No. 2" and "Stevens Chromo-Ray Projector") in treating the various disorders named, in conjunction with a certain "color charged" water. These disorders included, among others, amenorrhea, anemia, apoplexy, asthma, cancer, cataracts, diabetes, diphtheria, typhoid, smallpox, typhus fever, paralysis, pneumonia, sleeping sickness, venereal diseases and tuberculosis, all of which Stevens' equipment was represented to diagnose, as well as prevent or cure.

It was further shown that Stevens advocated the use of a Japanese substance called "Oil of Kurimonji" to which he ascribed a "magic . . . balsamic, curative action," and a supposedly mysterious "breath of life" or law of breathing called "Pranayama" which purported to keep the body "free from all aches and pains and diseases." The government further showed, among other things, that Stevens claimed to be an "Author, Artist, Physicist, Poet, Chromo-Dietitian, and Expert Human Analyst, christened by Luther Burbank, 'the Burbank of the Human Plant.' . . ." These and many other representations made for himself or his devices were declared to be fraudulent, and accordingly on May 17, 1941 a fraud order was issued against some of the names under which he operated. These were the Stevens Helio-Scientific Company, The Rainbow Publishers, The E. J. Stevens Company, The Rainbow Publishing Company, The E. J. Stevens Publishing Company, The E. J. Stevens Companies, The E. J. Stevens Color Institute and their officers and agents, all of San Francisco.

As in many similar cases, the flaw in this fraud order lay in the omission of Stevens' personal name and so, like some others whose schemes have been debarred from the mails, he flouted the government and continued in business—by operating under a new trade style and local address, Chromolux Company, Stratford Hotel, San Francisco. His device also took on a new name, "Chromolux Lamp." His explanation to those on his mailing list was that his companies had been "reorganized." But this trick was soon detected by the Post Office Department, which on July 12, 1941 issued a supplemental fraud order covering not only the name of Stevens himself but also the Chromolux Company, Lux Stevens and a good many other trade styles, old and new, under which he had been operating.

STIPULATIONS

Agreements Between Federal Trade Commission and Promoters of Various Products

The following items are abstracts of stipulations in which promoters of "patent medicines," cosmetics or medical devices have agreed with the Federal Trade Commission to discontinue certain misrepresentations in their advertising. These stipulations differ from the "Cease and Desist Orders" of the Commission in that such orders definitely direct the discontinuance of misrepresentations. The abstracts that follow are presented primarily to illustrate the effects of the provisions of the Wheeler-Lea Amendment to the Federal Trade Commission Act on the promotion of such products.

Almklov Preparations.—These consist of "Almklov's Scalp and Hair Tonic" and "X.E.M. Salve" put out by C. W. and Sigurd Almklov, Norman A. Hoel and Mrs. William G. Cook, all trading as Almklov's Pharmacy, Cooperstown, N. D. In March 1941 these persons signed a stipulation in which they promised the Federal Trade Commission that they would cease representing that "Almklov's Scalp and Hair Tonic" destroys dandruff, cures itching scalp, keeps the hair from falling out or penetrates the skin to extirpate the bacilli, and that "X.E.M. Salve" is a remedy or cure for eczema, barber's itch, refractory cases of ringworm, athlete's foot, psoriasis, dandruff or any itching cutaneous disorders or that it will remove the cause of these conditions and offer any value in their treatment in excess of affording symptomatic relief of itching and irritation.

Antiseptic Tar Hair Grower.—That this possesses antiseptic properties, contains essential oils or vegetable oils, will promote the growth of hair, eliminate itching scalp or be of any value in its treatment beyond affording temporary relief were misrepresentations that Eva B. Smith, trading as E. B. S. Manufacturing Company, New York, promised to withdraw from the advertising, in a stipulation that she signed with the Federal Trade Commission in February 1941. She also promised to withdraw such words as "eliminate" (referring to dandruff) and "antiseptic" and "grower" in the brand name.

Arthrene.—The representations that this nostrum "produces circulation, reduces swelling, dissolves crystals or cleanses the blood of uric acid" and is an effective remedy for arthritis, neuritis, sciatica, rheumatism or gout or affords more than temporary symptomatic relief of these ailments were to be withdrawn from the advertising, according to a stipulation signed with the Federal Trade Commission in February 1941 by F. D. Allderdice, trading as Arthrene Company, Jacksonville, Fla.

Berkeley Springs Mineral Water.—Burke Edwards of Bethesda, Md., who puts this out, promised the Federal Trade Commission in March 1941 that he would cease representing that this water is beneficial in the treatment of arthritis, diabetes, skin diseases or rheumatism.

Colagyn Hygienic Vaginal Jelly and O. M. 41 Hygienic Vaginal Jelly.—Smith Laboratory, Inc., Kansas City, Mo., entered into a stipulation with the Federal Trade Commission in March 1941 in which it promised that it would cease advertising that its products sold for feminine hygiene are unfailing contraceptives and that they constitute a competent remedy for certain diseases of women.

Fernet Vittone and Acqua Fiuggi.—E. Fucini and Company, Inc., New York, entered into a stipulation with the Federal Trade Commission in February 1941 promising to cease representing that the first-named product is a tonic beyond its effect as a gastric tonic; that every one requires a tonic, stomachic and digestive; that "Fernet Vittone" is an effective remedy for intestinal disturbances or has any effects other than those of a laxative, stomachic and gastric tonic, or that "Acqua Fiuggi" is an effective remedy for gallstones, kidney trouble, gout, bladder stones, defective blood circulation or excessive uric acid. About the same time Ferdinand Pettinella and the Pettinella Advertising Company of New York, which handles the Fucini advertising, signed a similar stipulation with the Commission.

G-I-M-P First Aid.—This was represented in the advertising of the Link Chemical Company, Emporia, Kan., as a competent treatment for strains, sprains, muscular aches and soreness and as effective for treating colds and athlete's foot and penetrating into the tissues and killing infection. In February 1941 the Link concern stipulated with the Federal Trade Commission that it would withdraw these misrepresentations from the advertising.

Hess Hair Milk.—In March 1941 the Federal Trade Commission accepted from Frank X. Hess, trading as Hess Hair Milk Laboratories, St. Paul, a stipulation in which he agreed to cease representing through the use of testimonials or in any other manner that "Hess Hair Milk" is a "natural treatment" or natural product; that it will prevent falling hair; that it is a hair tonic or scalp conditioner or has any remedial or tonic effects on the scalp or hair; that its use will restore the original, natural or youthful color to gray or faded hair; that it will cause hair to have a youthful appearance, or that it will prevent the appearance of age.

Indian Preparation.—Kate J. Hadley, trading as Mrs. W. W. Hadley, Boston, put this out as an effective cure for superfluous hair, representing that it was not a depilatory and that no similar product is used by dermatologists or sold in the proprietary trade; that it will open the pores, loosen the hair follicles, gradually destroy the roots of the hair or remove superfluous hair without injury to the skin. In February 1941 Kate J. Hadley promised the Federal Trade Commission that she would discontinue these misrepresentations in her advertising and also would cease using the word "Indian" either in the trade name or by pictorial representations to give the impression that the formula of her preparation was obtained from the Indian race.

Lillian M. Camp Preparations.—These were devices sold for improving personal appearance by Lillian M. Camp of New York, who, in February 1941, promised the Federal Trade Commission to withdraw misrepresentations from her advertising. She agreed to cease claiming that "Superior Hair Pencils" will have any effect on the roots of the hair, that "Leg Pads" are approved by the American Medical Association and that her "Face Lifters" will alter the shape or structure of the face.

Merz-Allium.—In February 1941 Merz and Company Chemical Works, Inc., East Orange, N. J., stipulated with the Federal Trade Commission that it would cease advertising this product as being bactericidal and effective in treating colitis, intestinal catarrh, diarrhea, coughs, bronchitis, arthritis, rheumatism, asthma, tuberculosis and some other things and to discontinue the misrepresentation that the preparation produces results not obtainable from any other and is recommended by the "drugless profession." Another government agency, the Food and Drug Administration, had previously taken action against the Merz concern, charging it with fraudulently labeling "Merz-Allium." On March 4, 1938 the Merz concern pleaded guilty to the charge in a federal court and was fined $100.

Pompeian Milk Massage Cream.—The Pompeian Company, Inc., of Baltimore signed a stipulation with the Federal Trade Commission in February 1941 agreeing to cease advertising that this product works differently from regular cleansing creams, that it will remove dirt to a greater extent than ordinary cleansing methods, including soap and water, and that the use of it will leave the face looking years younger.

Medical Examinations and Licensure

COMING EXAMINATIONS AND MEETINGS

ANNUAL CONGRESS ON MEDICAL EDUCATION AND LICENSURE

CHICAGO, Feb. 16-17, 1942. Council on Medical Education and Hospitals, Sec., Dr. William D. Cutter, 535 North Dearborn Street, Chicago.

MEDICAL CORPS, UNITED STATES NAVY

Examination. Assistant Surgeon with the permanent rank of Lieutenant (junior grade) and Acting Assistant Surgeon with the probationary rank of Lieutenant (junior grade), Jan. 5-9. Examination will be held at the Naval Hospitals at Chelsea, Mass., Newport, R. I., Brooklyn, Philadelphia, Norfolk, Va., Charleston, S. C., Pensacola, Fla., Corpus Christi, Tex., San Diego and Mare Island, Calif., Puget Sound, Wash., Great Lakes, Ill., Pearl Harbor, T. H., and Naval Medical Center, Washington, D. C. Apply Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

NATIONAL BOARD OF MEDICAL EXAMINERS
EXAMINING BOARDS IN SPECIALTIES

Examinations of the National Board of Medical Examiners and Examining Boards in Specialties were published in THE JOURNAL, November 1, page 1558.

BOARDS OF MEDICAL EXAMINERS

ALABAMA: Montgomery, June 16-18. Sec., Dr. J. N. Baker, 519 Dexter Ave., Montgomery.

CALIFORNIA: *Oral examination* (required when reciprocity application is based on a state certificate or license issued ten or more years before filing application in California), Los Angeles, Dec. 10. Sec., Dr. Charles B. Pinkham, 1020 N St., Sacramento.

CONNECTICUT: * *Medical Examination.* Hartford, Nov. 11-12. *Endorsement.* Hartford, Nov. 25. Sec., Dr. Creighton Barker, 258 Church St., New Haven. *Homeopathic.* Derby, Nov. 11-12. Sec., Dr. Joseph H. Evans, 1488 Chapel St., New Haven.

DELAWARE: Dover, July 14-16. Sec., Medical Council of Delaware, Dr. Joseph S. McDaniel, 229 S. State St., Dover.

DISTRICT OF COLUMBIA: * Washington, Nov. 10-11. Sec., Dr. George C. Ruhland, 6150 East Municipal Bldg., Washington.

FLORIDA: * Jacksonville, Nov. 24-25. Sec., Dr. William M. Rowlett, Box 786, Tampa.

HAWAII: Honolulu, Jan. 12-15. Sec., Dr. James A. Morgan, 48 Young Bldg., Honolulu.

INDIANA: Indianapolis, June 16-18. Sec., Board of Registration and Examination, Dr. J. W. Bowers, 301 State House, Indianapolis.

KANSAS: Topeka, Dec. 9-10. Sec., Board of Medical Registration and Examination, Dr. J. F. Hassig, 905 N. 7th St., Kansas City.

KENTUCKY: Louisville, Dec. 8-10. Sec., Dr. A. T. McCormack, 620 S. Third St., Louisville.

MAINE: Portland, Nov. 12-13. Sec., Board of Registration of Medicine, Dr. Adam P. Leighton, 129 State St., Portland.

MARYLAND: *Medical.* Baltimore, Dec. 9-12. Sec., Dr. John T. O'Mara, 1215 Cathedral St., Baltimore. *Homeopathic.* Baltimore, Dec. 9-10. Sec., Dr. John A. Evans, 612 W. 40th St., Baltimore.

MISSISSIPPI: *Reciprocity.* Jackson, December. Asst. Sec., State Board of Health, Dr. R. N. Whitfield, Jackson.

NEBRASKA: * Lincoln, Nov. 19-21. Dir., Bureau of Examining Boards, Mrs. Jeannette Crawford, 1009 State Capitol Bldg., Lincoln.

NEW HAMPSHIRE: Concord, March 12-13. Sec., Dr. T. P. Burroughs, Board of Registration in Medicine, State House, Concord.

NORTH CAROLINA: *Endorsement.* December. Sec., Dr. W. D. James, Hamlet.

NORTH DAKOTA: Grand Forks, Jan. 6-9. Sec., Dr. G. M. Williamson, 4½ S. Third St., Grand Forks.

OHIO: Columbus, Dec. 2-4. Sec., Dr. H. M. Platter, 21 W. Broad St., Columbus.

OKLAHOMA: * *Reciprocity.* Oklahoma City, Dec. 10. Sec., Dr. James D. Osborn, Jr., Frederick.

OREGON: Dec. 9-10 and Portland, January 21-23. Exec. Sec., Miss Lorienne M. Conlee, 608 Failing Bldg., Portland.

PENNSYLVANIA: Philadelphia, January. Acting Sec., Bureau of Professional Licensing, Mrs. Marguerite G. Steiner, 358 Education Bldg., Harrisburg.

SOUTH CAROLINA: Columbia, Nov. 10-11. Sec., Dr. A. Earle Boozer, 505 Saluda Ave., Columbia.

SOUTH DAKOTA: * Pierre, Jan. 13-14. Dir., Medical Licensure, Dr. J. F. D. Cook, State Board of Health, Pierre.

TEXAS: Austin, Nov. 17-19. Sec., Dr. T. J. Crowe, 918 Texas Bank Bldg., Dallas.

VERMONT: Burlington, Feb. 10-12. Sec., Board of Medical Registration, Dr. F. J. Lawliss, Richford.

VIRGINIA: Richmond, Dec. 9-12. Sec., Dr. J. W. Preston, 30½ Franklin Road, Roanoke.

WEST VIRGINIA: Charleston, Nov. 17-19. Sec., Public Health Council, Dr. C. F. McClintic, State Capitol, Charleston.

WISCONSIN: * Madison, Jan. 13-15. Sec., Dr. H. W. Shutter, 425 E. Wisconsin Ave., Milwaukee.

* Basic Science Certificate required.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ARIZONA: Tucson, Dec. 16. Sec., Mr. Franklin E. Roach, Science Hall, University of Arizona, Tucson.

COLORADO: Denver, Dec. 10-11. Sec., Dr. Esther B. Starks, 1459 Ogden St., Denver.

MICHIGAN: February 13-14. Sec., Miss Flora E. Dube, East Lansing.

RHODE ISLAND: Providence, Nov. 19. Chief, Division of Examiners, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

SOUTH DAKOTA: Aberdeen, Dec. 5-6. Sec., Dr. G. M. Evans, Yankton.

WISCONSIN: Milwaukee, Dec. 6. Sec., Professor Robert N. Bauer, 3414 W. Wisconsin Ave., Milwaukee.

Connecticut July Report

The Connecticut State Examining Board reports the written examination for medical licensure held at Hartford, July 8-9, 1941. The examination covered 7 subjects and included 70 questions. An average of 75 per cent was required to pass. Fifty-five candidates were examined, 35 of whom passed and 20 failed. The following schools were represented:

School	PASSED	Year Grad.	Number Passed
Yale University School of Medicine		(1941)*	1
University of Louisville School of Medicine		(1941)	1
Johns Hopkins University School of Medicine		(1937)	1
University of Maryland School of Medicine and College of Physicians and Surgeons		(1941)	1
Harvard Medical School	(1928),* (1938), (1939), (1940)*		4
Tufts College Medical School		(1911), (1940)	2
St. Louis University School of Medicine		(1940)	1
University of Nebraska College of Medicine		(1940)	1
Columbia University College of Physicians and Surgeons	(1935),* (1937),* (1939), (1940), (1941), (1941, 2)*		7
Cornell University Medical College	(1940),* (1941)		2
New York Medical College, Flower and Fifth Avenue Hospitals		(1941)*	1
New York University College of Medicine	(1938),* (1940),* (1941)*		3
Jefferson Medical College of Philadelphia		(1933)	1
Marquette University School of Medicine		(1940)	1
Queen's University Faculty of Medicine		(1919)	1
University of Toronto Faculty of Medicine	(1928),* (1940)		2
University of Western Ontario Medical School		(1941)	1
McGill University Faculty of Medicine		(1938)	1
Universität Heidelberg Medizinische Fakultät		(1920)	1
Regia Università degli Studi di Firenze. Facoltà di Medicina e Chirurgia		(1926)	1
Universität Bern Medizinische Fakultät		(1937)	1

School	FAILED	Year Grad.	Number Failed
Georgetown University School of Medicine		(1941)	1
Tufts College Medical School		(1939)	1
Cornell University Medical College		(1936)	1
Karl Franzens-Universität Medizinische Fakultät, Graz		(1922)	1
Medizinische Fakultät der Universität Wien	(1929), (1930), (1935), (1936, 2), (1937, 2)		7
Deutsche Universität Medizinische Fakultät, Prag		(1935)	1
Ludwig-Maximilians-Universität Medizinische Fakultät, München	(1920), (1938)		2
Regia Università degli Studi Bologna. Facoltà di Medicina e Chirurgia		(1937)	1
Regia Università degli Studi di Roma. Facoltà di Medicina e Chirurgia		(1937)	1
Regia Università di Napoli Facoltà di Medicina e Chirurgia	(1936), (1937), (1938)		3
Osteopath †			1

Twenty-four physicians were successful in the oral examination held for endorsement applicants at Hartford, July 22. The following schools were represented:

School	PASSED	Year Grad.	Endorsement of
Yale University School of Medicine	(1930), (1934),* (1937), (1938),* (1939), (1940, 2), (1940),* N. B. M. Ex.		
Johns Hopkins University School of Medicine	(1933)* Maryland	(1924)*	N.B.M.Ex.,
Boston University School of Medicine		(1936)*	N.B.M.Ex.
Harvard Medical School	(1921)* Ohio, (1932),* (1935),* (1939) N. B. M. Ex.		
Tufts College Medical School		(1939)	N. B. M. Ex.
University of Michigan Medical School		(1937)	Michigan
St. Louis University School of Medicine		(1938)*	Tennessee
New York University College of Medicine	(1935),* (1936),* (1939) N. B. M. Ex.		
University of Buffalo School of Medicine		(1939)	N. B. M. Ex.
Jefferson Medical College of Philadelphia		(1904)*	N. Carolina
University of Vermont College of Medicine		(1930)*	N.B.M.Ex.

* Licenses have not been issued.

† Examined in surgery only.

Alabama Reciprocity Report

The Alabama State Board of Medical Examiners reports 14 physicians licensed to practice medicine by reciprocity from June 11 through August 29. The following schools were represented:

School	LICENSED BY RECIPROCITY	Year Grad.	Reciprocity with
Emory University School of Medicine		(1937)	Georgia
University of Louisville School of Medicine	(1936), (1940, 2) (1940) Mississippi		Kentucky,
Louisiana State University School of Medicine	(1939), (1940)		Louisiana
Tulane University of Louisiana School of Medicine		(1940)	Louisiana
Johns Hopkins University School of Medicine	(1926), (1936)		Maryland
Harvard Medical School		(1925)	Georgia
Cornell University Medical College		(1933)	New York
Queen's University Faculty of Medicine		(1936)	Dist. Colum.
McGill University Faculty of Medicine		(1937)	Kentucky

Bureau of Legal Medicine and Legislation

MEDICOLEGAL ABSTRACTS

Dental Practice Acts: Suspension of License for Advertising Professional Superiority.—A section of the Business and Professions Code of California authorizes the Board of Dental Examiners to suspend or revoke the license of a dentist guilty of unprofessional conduct, which among other things is defined to include "the advertising of professional superiority or the performance of professional services in a superior manner." Proceedings were instituted against Barron, a licensed dentist, before the board, charging that he had so advertised in that he caused to be published in the Oakland telephone directory an advertisement, which, among other things, stated: "His 'Naturally Beautiful' plates, combined with 'Facial Reconstruction' in designing, makes him Oakland's leading Plate Dentist." After notice and hearing, the board suspended his license and Barron sought a writ of mandate to require the board to set aside its order of suspension. The trial court denied the writ and Barron appealed to the district court of appeal, first district, division 2, California.

Barron alleged that the action of the board constituted an abuse of discretion because the evidence before it was insufficient to indicate that he had made use of any advertising claiming professional superiority. The appellate court, however, found no merit in this contention. It appears entirely clear, said the court, that an advertisement as "Oakland's leading plate dentist" constitutes an advertisement of professional superiority.

Barron next contended that the accusation filed with the board was insufficient to confer jurisdiction on the board in that "the accusation charges in the alternative and not positively and is indefinite, ambiguous, uncertain and unintelligible." This argument was directed at an allegation in the accusation that Barron did advertise "professional superiority or the performance of professional services in a superior manner." We find no merit in this argument, said the court. While so-called alternative pleading is ordinarily condemned, the accusation here was sufficient to confer jurisdiction on the board as no material allegations were alleged in the alternative. The accusation would have been sufficient in this regard if it had charged merely that the petitioner had been guilty of unprofessional conduct as defined in the Business and Professions Code in that Barron had advertised in a certain manner setting forth the advertisement in full.

Barron next contended that the accusation, on which the proceedings before the board was based, was not verified as required by the Business and Professions Code, since it was sworn to before the secretary of the Board of Dental Examiners, who, Barron claimed, was not authorized by law to administer oaths. The court, however, did not deem it necessary to discuss the question as to whether or not the secretary was authorized to administer oaths, since the defect complained of, if any, was waived by Barron by proceeding to a hearing before the board without objection.

Barron next argued that the accusation filed with the board charged a violation of the Business and Professions Code, "which code was not effective as law at the time of the commission of the alleged acts." He claimed that the last act of advertising he had done was the approval of the proof for the advertisement in the directory, which he had done on Aug. 23, 1937, and that the code in question did not become effective until Aug. 27, 1937. It may be pointed out, answered the court, that the advertising was done at Barron's direction in the November 1937 telephone directory but, in any event, the provisions of the Business and Professions Code concerned were merely continuations of previously existing statutory provisions, and Barron was properly charged under the code with acts done prior to Aug. 27, 1937, in violation of the previously existing statutory provisions as continued in the new code.

Finally, Barron contended that the Board of Dental Examiners acted "arbitrarily, capriciously and oppressively" in suspending his license. Even assuming, he aruged, that "the alleged offensive advertisement constitutes unprofessional conduct" and that the evidence shows that it was "run or printed in the November 1937 issue of the Oakland Telephone Directory," there is "no affirmative showing that the advertisement was ever brought home to the public and no witness called so testified." We are of the opinion, however, answered the Supreme Court, that the fact that the regular issues of the directory of the telephone company are "brought home to the public" is a matter of such common knowledge that there was no necessity for testimony with respect thereto.

For the reasons stated, the judgment of the lower court dismissing Barron's petition for a writ of mandate was affirmed. —*Barron v. Board of Dental Examiners of State of California 113 P. 2d, 247 (Calif., 1941).*

Records of County Health Commissioner with Respect to Typhoid Carrier Amenable to Court Subpena.—Marie A. Thomas died of typhoid, allegedly after the bacillus had been transmitted to her by a food handler who conducted a small hotel at which she had been a guest. The food handler, so it was claimed, was to her own knowledge a "typhoid carrier." The decedent's administrator brought suit against the food handler and moved for an order requiring the state health department and the health commissioner of the county in which apparently the food handler resided "to produce . . . such records and papers as might indicate whether or not defendant (food handler) was a typhoid carrier, and, if so, might show what, if any, knowledge defendant had of such condition, and what, if any, information was furnished her by the ——— County or State Health Departments, to the effect that she could transmit the disease to others." The county health commissioner opposed the motion, apparently on the ground that the records of his office were privileged and could not be produced except with the consent of the defendant. The trial court ordered the records produced, but the supreme court, appellate division, second department, New York, on appeal, held that the county health commissioner could not be required to bring the records into court, and the administrator appealed to the Court of Appeals, of New York.

No privilege, said the Court of Appeals, attaches to the records in question of the county health commissioner and the public policy of the state of New York as expressed in the Public Health Law and the Sanitary Code confers no such privilege. Privilege does not exist unless conferred by some statute, and in New York the statutes point the other way and seem to require that such records, so far as they refer to known or suspected typhoid carriers, be made available in a case such as this. The Sanitary Code, which has the force of law, requires local health officers to keep the state department of health informed of the names, ages and addresses of known or suspected typhoid carriers; to furnish the state health department necessary specimens for laboratory examination in such cases; to inform the carrier and members of his household of the situation, and to exercise certain controls over the activities of the carriers, including a prohibition against any handling by the carrier of food which is to be consumed by persons other than members of his own household. Why should the record of compliance by the county health officer with these salutary requirements be kept confidential? Hidden in the files of the health office, it serves no public purpose except a bare statistical one. Made available to those with a legitimate ground for inquiry, it is effective to check the spread of the dread disease. It would be worse than useless to keep secret an order by a public officer that a certain typhoid carrier must not handle foods which are to be served to the public.

The Court of Appeals denied the applicability of section 352 of the Civil Practice Act of New York, which prohibits a physician, except with the consent of his patient, from divulging in court any information which he obtained in attending a patient in a professional capacity and which was necessary to

enable him to act in that capacity. The information in the health commissioner's files, said the Court, concerning the food handler in this case, if there was any such information there, was not acquired by the health commissioner "in attending a patient in a professional capacity" nor was the information "necessary to enable him to act in that capacity." Although the information may have come to the commissioner from a physician in private practice, the transmittal from that physician to the public officer was in obedience to the express command of the Public Health Law. An intention that these records as to communicable diseases should not be kept confidential is found in the history of that law. That law has provided since 1909 as to one of the communicable diseases (tuberculosis) that the report "shall not be divulged or made public." That law was amended in 1939 by naming three other diseases, not including typhoid, as to which the reports should be kept secret. It seems to follow that similar reports as to other communicable diseases are not so privileged.

Accordingly, the Court of Appeals, in effect, ordered the production in the trial of the records asked by the administrator. —*Thomas v. Morris, 36 N. E. 2d. 141 (N. Y., 1941).*

Physical Examination: Right to Compel Submission to Cystoscopic Examination.—As part of a physical examination before trial, the defendants sought to compel the plaintiff to submit to a cystoscopic examination. From an order denying that right, the defendants appealed to the New York supreme court, appellate division, fourth department.

The plaintiff's evidence indicated that a cystoscopic examination is "a major operation . . . most painful . . . (and) has been known to cause death." The defendants, however, submitted the affidavit of a medical expert stating that he had never heard of such an examination from which there had "been any very harmful, serious or fatal results . . . nor . . . a fatality resulting simply from a cystoscopic examination." The affidavit further stated that such an examination "cannot be compared . . . in seriousness with a major operation." The appellate division said that while persons had been compelled to submit to a roentgen examination and to the taking of a few drops of blood, the court had refused to compel a plaintiff to submit to certain exercises and breathing tests or to eat barium meal to assist in obtaining a roentgenogram of the stomach. In the opinion of the court, the defendants' request was asking it to go much further than it had gone before in subjecting a person to physical pain and danger to health. The defendants' request for a cystoscopic examination was denied, as was also a motion for leave to appeal to the Court of Appeals.—*Carrig v. Oakes, 18 N. Y. S. (2d) 917; 18 N. Y. S. (2d) 918 (N. Y., 1940).*

Society Proceedings

COMING MEETINGS

American Society of Tropical Medicine, St. Louis, Nov. 11-14. Dr. E. Harold Hinman, Wilson Dam, Ala., Secretary.

Annual Conference of Secretaries of Constituent State Medical Associations, Chicago, Nov. 14-15. Dr. Olin West, 535 N. Dearborn St., Chicago, Secretary.

National Society for the Prevention of Blindness, New York, Dec. 4-6. Mrs. Eleanor Brown Merrill, 1790 Broadway, New York, Executive Director.

Puerto Rico, Medical Association of, Santurce, Dec. 11-14. Dr. David E. Garcia, P. O. Box 3866, Santurce, Secretary.

Radiological Society of North America, San Francisco, Dec. 1-5. Dr. Donald S. Childs, 607 Medical Arts Bldg., Syracuse, N. Y., Secretary.

Society for the Study of Asthma and Allied Conditions, New York, Dec. 6. Dr. W. C. Spain, 116 East 53d St., New York, Secretary.

Society of American Bacteriologists, Baltimore, Dec. 29-31. Dr. I. L. Baldwin, Agricultural Hall, University of Wisconsin, Madison, Wis., Secretary.

Southern Medical Association, St. Louis, Nov. 10-13. Mr. C. P. Loranz, Empire Bldg., Birmingham, Ala., Secretary.

Southern Surgical Association, Pinehurst, N. C., Dec. 9-11. Dr. E. Alton Ochsner, 1430 Tulane Ave., New Orleans, Secretary.

Southwestern Medical Association, El Paso, Texas, Nov. 20-22. Dr. Louis W. Breck, 116 Mills St., El Paso, Secretary.

Western Surgical Association, St. Paul, Dec. 5-6. Dr. Arthur R. Metz, 2449 Washington Blvd., Chicago, Secretary.

THE AMERICAN RHEUMATISM ASSOCIATION

Eighth Annual Meeting, held in Cleveland, June 2, 1941

DR. A. R. SHANDS JR., Wilmington, Del., Secretary

(Concluded from page 1566)

Cytologic Study of Synovial Tissue in Various Types of Arthritis

DRS. CURRIER MCEWEN, ERNST W. BERGMANN and HARRY MOST, New York: Our purpose in this study was to apply the supravital method of staining to the examination of synovial tissue removed at operation in the manner previously employed in studies of rheumatic and rheumatoid subcutaneous nodules (*J. Exper. Med.* **55**:745 [May] 1932; *Arch. Path.* **25**:303 [March] 1938).

The findings in the various types of disease studied were as follows:

Tuberculous Arthritis: In 10 of the 13 synovial tissues from active human cases, typical epithelioid cells were found. The total number of cells was moderate to large: Besides epithelioids, small and medium sized fixed tissue cells like those previously described for rheumatic and rheumatoid subcutaneous nodules were found in every case, small and medium lymphocytes in all but 1 and monocytes, clasmatocytes and neutrophils in all but 3. Two patients with clinically and pathologically healed joint tuberculosis showed but few cells and no epithelioids. Eight examples of tuberculous arthritis in rabbits gave results identical with those of the active human cases except that epithelioid cells were more numerous.

Rheumatoid Arthritis: One healed joint gave findings like those of the healed tuberculous ones. In 6 active cases, cells were numerous and predominantly of the medium sized and large fixed tissue type. Clasmatocytes, lymphocytes and neutrophils occurred in proportions similar to those of the tuberculous tissues. In general, the cells were like those found previously in scrapings of rheumatic and rheumatoid subcutaneous nodules.

Traumatic Joint Disturbances: Five cases of some chronicity showed a moderate number of cells consisting predominantly of small fixed tissue cells with smaller numbers of medium sized fixed tissue cells, neutrophils, lymphocytes and clasmatocytes. Two showed a very few unstimulated monocytes.

Synovitis of Unknown Cause: In 3 cases of this kind, findings were similar to those in rheumatoid arthritis.

Miscellaneous: Study was made of 2 essentially normal joints (old poliomyelitis cases), an uncomplicated osteoarthritic joint and a Charcot joint. In all, the cells were extremely few in number and consisted of small fixed tissue cells, neutrophils and small lymphocytes.

These results are consistent with previous studies on rheumatoid subcutaneous nodules and tuberculous tissues and give further support to the view that the medium sized and large fixed tissue cells are indeed the "characteristic" cells of rheumatic and rheumatoid lesions.

Whether studies of this type carried out at the time of operation would be of value to the surgeon in deciding whether to do synovectomy or arthrodesis is not yet clear. When present in good numbers, epithelioid cells were found in five to ten minutes of search, but how supravital examination would compare with frozen sections in speed and accuracy has not been tested. Furthermore, although epithelioid cells were found in none but tuberculous synovial tissues they were not found in all the tuberculous cases. Actually, we believe that the finding of definite epithelioid cells would warrant a diagnosis of active tuberculous arthritis but that a lack of them would not exclude tuberculosis.

DISCUSSION

DR. GRANVILLE A. BENNETT, Boston: In his previous investigations of subcutaneous nodules with the aid of supravital technic, Dr. McEwen was dealing with a tissue reaction which constitutes, in my opinion, the most characteristic single lesion in rheumatoid arthritis. The present study is concerned with tissues which, although differing morphologically and perhaps functionally in the various portions of the joints, are all con-

nective tissue derivatives. It has been demonstrated in microscopic sections that these tissues respond to injury in a manner similar to the other connective tissues of the body. The reaction elicited in synovial tissues by a given inflammatory irritant is a complicated cellular and vascular process as it is in other connective tissues. Since in the interpretation of a lesion the pathologist is frequently forced to depend as much on its grosser structure as on its cellular components, one might anticipate that diagnosis from purely cytologic studies of synovial tissues would be difficult and frequently impossible. In our laboratory we have examined microscopically the joint tissues, in more than 1,000 cases of joint disease. Included in this group were 125 surgically treated and 30 cases of rheumatoid arthritis examined post mortem. It has been our experience that one's ability to distinguish different forms of arthritis on the basis of the synovial tissue changes alone is limited. In rheumatoid arthritis the synovia shows a chronic inflammatory reaction which frequently contains no diagnostic features. The presence of focal collections of lymphoid cells with or without germinal centers, although frequently observed in rheumatoid arthritis, has not, in our experience, been limited to this disease. The presence of "fibrinoid" deposits on or within the synovial tissues has likewise not proved to be a disease-specific finding. As a result of these and other observations, we have been forced, in reporting our pathologic findings on tissues removed from the joints of rheumatoid arthritis patients, to return a diagnosis of "chronic synovitis." In certain instances we may feel justified in adding "consistent with rheumatoid arthritis." In the diagnosis of tuberculosis the pathologist must depend on the grosser structure of the lesion and the presence of caseation necrosis as well as on the cytologic features of the lesion. It would seem probable that the study of frozen sections of synovial tissues would again give more conclusive results in diagnosis than would an examination by supravital technic of cellular scrapings. It should be pointed out that tubercles or tuberculous granulation tissue in the synovia may be entirely covered by a formless caseating mass. In such instances it is only by the examination of the deeper portions of sections cut in a plane vertical to the lining surface of the joint that one is able to detect the characteristic lesions. I have frequently observed small or medium sized multinucleated giant cells in the fixed tissue sections of the synovia of rheumatoid arthritis patients. If Dr. McEwen has observed these same cells in his preparations of synovia from rheumatoid patients, I should like to hear how they compare with giant cells he has observed in other lesions, especially in tuberculosis.

Dr. Walter Bauer, Boston: My experience with the supravital technic as a diagnostic aid has been limited to cytologic examinations of normal and pathologic synovial fluids. Although the supravital technic allows for more accurate identification of the various types of mononuclear phagocytes than any fixed stain preparations, the latter method suffices for cytologic examination of most pathologic effusions. The diagnosis of joint disease is not possible if one relies solely on cytologic studies of the synovial fluid. If, however, one observes also the appearance, presence or absence of clot, viscosity, total protein, globulin, mucin and sugar contents, the examination of synovial fluids will be found to be of diagnostic aid. Largely through the efforts of Drs. M. W. Ropes and H. C. Coggeshall, such detailed examinations of 750 fluids from various types of joint disease have been made. Analyses of these data indicate that the majority of the fluids can be separated into two groups. Group 1 fluids are essentially traumatic in nature (traumatic arthritis, degenerative joint disease, Charcot joints and osteochondromatosis). Group 2 includes those obtained from specific infectious arthritides of known origin and rheumatoid arthritis. Most group 1 fluids are clear and do not clot, whereas group 2 fluids may be clear or turbid and usually do clot. Total leukocyte counts above 1,000 are rarely encountered in group 1 fluids, whereas in group 2 they are generally 3,000 or higher. The polymorphonuclears are less than 500 in group 1 and ordinarily greater than 1,000 in group 2. The protein concentration is less than 5.2 Gm. per hundred cubic centimeters in group 1 but varies from 3.0 to 8.9 Gm. in group 2. The changes in the globulin fraction are most significant. The mucin concentration is usually lower in group 2, but more important than the concentration are its precipitability with acetic acid and the viscosity of the fluid. The mucin precipitate from group 1 fluids is ropy and the solution clear, while the precipitate from group 2 fluids is usually friable and the solution cloudy. Group 1 fluids usually show only a moderate reduction of viscosity as compared to a definite reduction in most group 2 fluids. In group 1 the serum fluid fasting sugar difference is usually normal (less than 10 mg. per hundred cubic centimeters) in contrast to a much greater difference in the majority of group 2 fluids. To summarize, aspiration of a turbid fluid which clots and has a low viscosity, a total leukocyte count above 3,000 with absolute polymorphonuclear count above 500, a protein content above 5.0 Gm. per hundred cubic centimeters and a serum-fluid sugar difference of over 20 mg. per hundred cubic centimeters indicates that the joint disease is not in group 1. Results in individual cases have shown that examination of joint fluid used in conjunction with history, physical examination and other laboratory tests is of definite diagnostic and prognostic value.

Dr. Currier McEwen, New York: I did not mean to imply that supravital studies of this kind would be of any great help in making a diagnosis of rheumatoid arthritis, since the cells one finds in the rheumatoid tissues are present also in other types of lesions. I do believe, however, that the presence of typical epithelioid cells would warrant a diagnosis of tuberculous arthritis. To be sure, Florence Sabin and Cunningham and others have found that the injection of certain lipids into tissues leads to the formation of epithelioid cells, but from the practical clinical standpoint I believe the finding of epithelioid cells in synovial tissue would warrant a diagnosis of tuberculosis and the exclusion of rheumatoid arthritis or other diseases which might give the same gross appearance clinically and at operation. I want to emphasize that these studies which I have reported were based on examination of individual cells supravitally stained and not on the usual tissue sections prepared by the ordinary histologic technic. We did make histologic studies, of course, and from study of them I agree with Dr. Bennett that the collections of lymphoid cells are not pathognomonic of rheumatoid arthritis. Dr. Bennett inquired about the giant cell illustrated in one of the lantern slides. That cell was not from synovial membrane but from a scraping of a rheumatic subcutaneous nodule made in 1932. I believe it represents the kind of giant cell that characterizes the Aschoff body. We have found similar cells in scrapings of rheumatoid nodules and synovial granulations but none with more than three nuclei. As to Dr. Bauer's statement I would again call attention to the fact that I was reporting studies made on scrapings of tissues and not on fluids. We have in a good many cases obtained samples of fluid before the joint capsule was opened and compared these with the tissue scrapings. The types of cells found in the fluid and tissues were different even in the same joint. I agree with Dr. Bauer that the supravital method of staining has no special advantage over the Wright method for the routine staining of synovial fluids. One will probably do better with whichever method one knows best. But for the study of individual tissue cells the supravital method is better technically and also gives more information. I would go even further than Dr. Bauer, however, and say that I doubt whether the examination of synovial fluid gives much information of value in diagnosis beyond that which one gets from the gross appearance, bacteriologic culture and guinea pig inoculation. If one carries out cytologic studies on synovial fluids from 100 patients each with rheumatic fever, rheumatoid arthritis and gonococcic arthritis, one will find different trends in the three groups; but individuals in each group will overlap. I believe that the collection of data in these fluids is important for research purposes, but I doubt that they will be found sufficiently useful to be adopted as routine clinical tests. This conclusion is drawn only from cytologic examination of the fluids, however, for I have not done all the other types of study included in Dr. Bauer's analysis.

The Liver an Etiologic and Therapeutic Factor in Certain Types of Blood Disease and in Gout and Gouty Arthritis

Dr. John Staige Davis Jr., New York: I report 21 cases of blood dyscrasias associated with symptoms of either rheumatoid arthritis or gout. One of these cases was fibrositis, 1 was acute rheumatic fever and 3 were both rheumatoid arthritis and gout. The signs and symptoms of both diseases were classic. The observation of these 21 associated cases in the short time of two years would seem to lend further evidence to the reported relation of liver disease to arthritis, provided one accepts the theory that severe diseases of the blood are accompanied by liver change.

Four of the patients with hemolytic icterus had their spleens removed; one recovered completely from his gout, 1 died from postoperative pneumonia, although her gout had disappeared, 1 recovered from fibrositis and the fourth has had no more attacks of rheumatic fever. Of the remaining 3, 1 has shown no improvement in generous administration of concentrated liver and vitamins, while another was given full complement liver but was unable to tolerate it, and the third was given large doses of full complement liver.

One man had his spleen removed through an error in diagnosis. On operation his splenomegaly was found to be of syphilitic origin.

The full complement liver was used for four reasons: 1. These patients were quite anemic, and liver therapy was indicated for supportive therapy. 2. Concentrated liver for the most part had been ineffective in the treatment of both arthritis and gout. Furthermore, cases of gout have been known to be precipitated by concentrated liver administration. 3. It was thought that there might be some deficiency in a particular fraction of the liver in either one or both of these diseases, which substance might be removed in concentrating the liver fraction. It was therefore decided to use as complete a fraction as possible. Also, since the useful fraction might probably be present in minute quantities, it was deemed necessary to use rather large doses. 4. Concentrated liver is high in the hemopoietic fraction; it would therefore be more apt to cause rapid maturation of the red cells with accompanying extrusion of the nuclei and thus an attack of gout might be provoked.

The liver fraction which we have found to be most useful is marketed under the trade name of Campolon. It differs from the other available liver extracts not only as a result of its low potency but also because it is not heated in preparation. Both purine and protein are removed. This preparation has been given to a series of 25 patients with gout and the results have been favorable. It is no better than colchicine in acute attacks and in some cases not so dramatic. Its effects, however, are more lasting. The average effect on the uric acid in 16 of these cases will be reported at a later date.

It is well understood that in attempting to evaluate any treatment of acute gout one is treading on dangerous ground. Nevertheless the favorable results obtained with chronic gout shown here present at least a new method of approach to the understanding of the disease.

The results in rheumatoid arthritis have been disappointing, although a few cases have been dramatic.

Twenty-one cases of blood disease accompanied by various arthritic states support the hypothesis of the association of arthritis and liver disease. The beneficial effects of full complement liver extract on certain of these patients, particularly those with gouty arthritis, suggests that gout is a deficiency disease. Two patients with gout, 1 with fibrositis and 1 with rheumatic fever associated with hemolytic icterus, recovered following splenectomy.

DISCUSSION

Dr. E. F. Hartung, New York: Dr. Davis has hypothesized liver damage in gout and rheumatoid arthritis as a possible factor in their etiology. He bases this on four observations: (1) the relationship of blood dyscrasias to rheumatoid arthritis and gout, (2) the observation of gout and rheumatoid arthritis in the same patient, (3) the observation that splenectomy in some blood dyscrasias results in the disappearance of the symptoms of gout, and (4) the observation that a full complement liver extract has had beneficial effects in some cases of gout. If a much larger series of cases bears out these relationships, his observations will assume great importance. As to observation 4, I have used Campolon in gout both between and during attacks and have not yet made up my mind as to the therapeutic effect. I have seen some of Dr. Davis's own cases in which the effect appeared to be beneficial. The whole theory of hormones of liver or kidney origin is interesting in relationship to the causation of gout. In order to study the problem of gout, there are five points that I think are important: 1. A restudy of the microscopic anatomy of the liver in gout. 2. An independent conclusion as to the validity of liver function tests and the application of these in cases of gout. There are so many questionable reports on liver function tests that I think the field has to be cleared from the point of view of liver function tests in themselves before one can draw any conclusions as to their value in rheumatoid disease. 3. The pharmacology of colchicum. It seems to me that a complete understanding of its mode of action would lead to a clarification of the mechanism of gout. 4. The study of the various components of the blood from the point of view of uric acid content, whole blood, plasma, serum and cells. 5. A study of other tissue-extracted hormones besides uricase, such as nucleosidase.

Dr. C. H. Slocumb, Rochester, Minn.: The effects of concentrated liver extract and a special purine free liver extract have been studied in a few cases of gout at our clinic. On three occasions a purine free liver extract was given by mouth and in each case from twenty-four to forty-eight hours after starting it fever and general malaise developed and in 2 cases acute attacks of gouty arthritis occurred. The presence of the systemic reaction made studies of the level of uric acid in the blood and of the urinary excretion of uric acid unreliable and variable. One patient who had pernicious anemia and gout complained that when he took liver for the control of the pernicious anemia his gouty arthritis recurred and when he did not take liver he did not have gouty arthritis. Our experience at the clinic is that the liver extracts that we have used always have made gout worse. We have not used Campolon for patients with gout as Dr. Davis has. I cannot yet understand why the action of crude liver extract (Campolon) is different from the more refined products.

Dr. W. B. Rawls, New York: During the past two years, I have been studying all cases of gout with particular reference to intake and have noted that about 75 per cent of these cases are not due to excessive intake of food or alcoholic beverages and that, as a rule, underweight exists and frequently there is liver dysfunction. I believe that this group of patients constitutes a separate clinical entity from the usually accepted case of gout and that there are causative factors other than excessive intake of food. For example, a South American patient 5 feet 6 inches (168 cm.) tall and weighing 128 pounds (58 Kg.) had been treated in clinics in France, Germany and England for recurrent attacks of gout, which usually appeared several times each year. This patient had originally been given the old arsphenamine preparations for syphilitic infection. When I first saw him he had a plasma uric acid of 7.0 mg. per hundred cubic centimeters, secondary anemia with a color index above 1 and a liver function test of 48 per cent by the hippuric acid test. The administration of ferrous sulfate and liver, given separately, failed to correct the anemia, but when the two were given together a normal blood count was obtained. With this routine and measures to improve the liver function there was cessation of his symptoms of gout and it has now been eighteen months since his last attack, the longest symptom free period in over six years. His uric acid remains about 4 mg. per hundred cubic centimeters and his liver function varies between 65 and 88 per cent by the hippuric acid test. I do not know whether liver function plays a part in these cases, but disorders of liver function occur frequently in the type of case described, which is, I believe, a clinical entity different than the usual form of gout and requires different treatment. I have not used Campolon in the doses described by Dr. Davis but only as an adjunct in combating the anemia present and raising the general resistance of the patient.

DR. L. MAXWELL LOCKIE, Buffalo: I feel that some of the benefit described by Dr. Davis may come about as a result of the specific effect of liver to maintain a proper blood level in the patient with pernicious anemia, thus preventing excessive blood cell destruction or regeneration. Symptoms characteristic of gouty arthritis and controlled by appropriate measures do occur during exacerbations and remissions of pernicious anemia as well as in cases of leukemia when excessive cellular destruction goes on. During these periods relatively large amounts of "nuclear" material are released from the red blood cells or from the white blood cells. If severe neuritic pain occurs during such a time, usually it can be controlled by adequate doses of colchicine.

DR. JOHN STAIGE DAVIS JR., New York: Dr. Lockie has suggested that patients with gout felt better on the liver therapy because of the general effect which they received. There was no specific action. It seemed to me to be of a more specific nature, as the more concentrated livers and the other unconcentrated livers did not produce the same effect. I feel that it in some way interferes with the formation of uric acid and that therefore less is formed.

Fractures in Chronic Arthritis

DR. GEORGE J. BAER, Boston: The incidence of fractures in chronic arthritis, the rate of healing and the complications following fractures have been studied in 1,625 case records of arthritis at the Robert Breck Brigham Hospital. The records examined included the disease in all its accepted classifications. Fractures occurred twenty-one times, or in 1.2 per cent of the cases. At times it was difficult to differentiate a fracture from "disintegration" at the bone ends due to atrophy and cystic degeneration. If such disintegrations were considered as fractures, the incidence of fractures in chronic arthritis would be increased. Such "infractions," as they have been described by Knaggs, have not been classified as fractures in this survey. A fracture to be classified had to satisfy the criteria commonly accepted by all surgical textbooks.

One would expect fractures to be common in patients with rheumatoid arthritis because of the severe bone atrophy, loss of lime salts, cystic degeneration of bone and loss of muscle tone. However, these patients, because of the loss of joint function, pain and muscular weakness, lead a rather guarded existence, so that the forces necessary to produce a fracture are infrequently encountered.

In 21 cases of fractures, 14 of them occurred in rheumatoid arthritis. They were all produced by minor trauma except for 5 produced by manipulation of a joint under anesthesia. Simple fractures were encountered most frequently; there were no compound fractures. In each instance there was bone atrophy, which was minimal in 4 cases and severe in 10 cases. Following the healing of a fracture, the bone atrophy persisted in all parts of the bone except about the fracture site, where the newly calcified callus was conspicuous by its density. Union took place in all cases and proceeded normally except in 1 case —a fracture of the midshaft of the femur, in which union was delayed.

In 8 cases the sedimentation rate was elevated at the time the fracture was sustained. The fact that a fracture occurred did not alter the course of the active arthritis, nor was there a generalized or localized exacerbation in the quiescent cases.

One fracture was found in a patient with gonococcic arthritis. The disease had been present six weeks when a Colles fracture was sustained. The wrist joint had been involved in the generalized gonococcic arthritis, there was slight bone atrophy and healing took place in six weeks.

There were 6 patients with fracture in osteoarthritis, 4 women and 2 men. All these patients were in or past the sixth decade of life. A simple fracture was the most common and there were no compound fractures encountered. All these were the result of major trauma. Firm union took place in all cases in normal time. Atrophy of the fractured bones was not noted in 4 cases and was minimal in 2 cases. The sedimentation rate was elevated in 2 of the cases and not determined in the others. Fractures did not alter the arthritic process.

Since this material has been compiled, three fractures in patients with rheumatoid arthritis have been observed within one month. All are progressing normally.

It must be emphasized that, when a fracture occurs in a limb with joints involved by arthritis, immobilization in a plaster cast is justified only long enough to allow a sufficient callus to form to hold the fragments in good alinement. The cast must then be removed and the limb immobilized in a splint so arranged that passive motion of the affected joint can be easily accomplished to prevent ankylosis or extensive limitation of motion.

It is quite likely that fractures in chronic arthritis are more common than the figures in this survey would indicate. Once the possibility is recognized and a more careful search made for fractures, future surveys should reveal a higher percentage of cases.

DISCUSSION

DR. J. ALBERT KEY, St. Louis: I would expect fractures to be more frequent than dislocations in rheumatoid arthritis because the joints are stiff and the bones are weak, and I would expect to find all fractures to be infrequent among persons whose activity is restricted. On the other hand, it does not take much force to break an atrophic bone. I was interested in the statement that there was no alteration in the course of the disease as a result of the fracture. A few years ago Colin McKenzie had the experience of having a patient with severe arthritis sustain a traumatic fracture of the hip. As the hip healed the arthritis got well. He drilled large holes in the metaphysis of bones, especially around arthritic knees, and curetted out the fatty material and reported excellent results in several patients. I think some similar operations were done at the Mayo Clinic. Fractures in patients with osteoarthritis are relatively common because certain fractures occur in old persons. Most people who break their wrists or hips are beyond middle age. Those people are treated as though they were normal individuals. In treating fractures in patients with osteoarthritis there is little danger of stiffness of the joints and it is advisable to continue the immobilization longer than usual. It has been my experience that atrophic bone heals more rapidly than normal bone because the rate of healing varies inversely with the density of the bone.

DR. LORING T. SWAIM, Boston: This paper brings up questions about conditions present in the atrophic bone. Several of these fractures of the lower end of the femur were produced with no greater power than the hands during manipulation. There was no sense of breaking. The bone seemed so soft that it just crushed together above the condyles. Yet in spite of this softness the calluses healed normally and rapidly and were as strong afterward as the normal bone. The reason these bones crushed so easily was that the adhesions and thickened fibrous capsule in the back of the knee was stronger than the atrophic bone, and the bone gave before the adhesions would break or stretch. Manipulation is a procedure to be done with caution, because fracture may take place. It is also found that, in osteotomies, arthroplasties and other operations on arthritic bones, healing occurred as rapidly and normally as in people who do not have arthritis. In spite of the softness of these bones and the decalcification, they do not seem to fracture frequently. There were no ununited fractures in any of these cases even when the bone appeared extremely atrophic, nor did the activity of the disease seem to have any effect on it. I have found no explanation of it except that the arthritis does not seem to affect the ability of the periosteum to lay down bone for callus to form or for the bone to repair. Pathologists may be able to answer this question and thus give us more information as to why arthritis does not affect the healing power of the bone. Twenty years ago we operated on arthritic bones with some fear. This has entirely gone now.

DR. GEORGE J. BAER, Boston: It is obvious that in osteoarthritis or degenerative joint disease fractures are more common. At Peter Bent Brigham Hospital we see only those cases which have symptoms. The 5 cases that I have seen recently have all been in hips and it is difficult to be sure they are healing. The oldest one has gone five months, and I hesitate to say whether it has gone faster than the other hips we have nailed.

Oral Stilbestrol Therapy in Menopause Arthritis

Dr. William K. Ishmael, Oklahoma City: The term "menopause arthritis" is applied to that group of cases in which the symptoms appear during or soon after the natural or artificial menopause. One hundred and seventeen patients having rheumatic symptoms which were concurrent with other manifestations referable to the menopause and which existed only since the onset of the menopause were carefully selected. Each patient was given, on an average, 1 mg. of stilbestrol by mouth every three days. The frequency of administration and the dose of the drug were altered in many patients. "Supportive" measures consisted of the usual indicated dietary regimen, rest, avoidance of traumatic factors, correction of metabolic and other endocrine dyscrasia, physical therapy measures and ordinary orthopedic support. When and if complete relief of symptoms occurred the stilbestrol was withdrawn, the other measures of treatment being continued. When and if symptoms reappeared, the stilbestrol was resumed. The patients were not advised as to the nature of the tablets.

As control, the natural estrogenic substance was administered orally to 34 patients, 0.12 mg. daily. As further control 178 patients having "other symptoms" of the menopause were placed on oral stilbestrol therapy with the same routine of dosage. Note should be made that in the latter control group the use of any "supportive" measures was carefully avoided. This group was under the direction of Dr. Owen Royce.

It was found that 79 per cent of those patients diagnosed as having menopause arthritis had complete relief of their symptoms from the stilbestrol tablets combined with the "supportive" measures. When the tablets were discontinued around 80 per cent of this group had return of symptoms in an average of twenty-one days. After resuming the stilbestrol, around 97 per cent again became pain free and remained so as long as the drug was continued. These figures must be considered cautiously. The psychic factors and the natural tendency for remission and flare-up make it almost impossible to evaluate their reactions accurately. Nineteen per cent of the group receiving the oral stilbestrol together with "supportive" measures were improved and 2 per cent failed to respond in any degree. This compares favorably with the 80 per cent remissions from the parenteral administration of stilbestrol previously reported.

Of the control group, in those receiving the natural estrogenic hormone orally 30 per cent had complete relief of symptoms, 35 per cent were "improved" and 35 per cent had no degree of relief. This control group received the same "supportive" measures as those receiving the stilbestrol. The failure of this group to respond was most likely the result of inadequate concentration in the blood stream.

In the third group, classed as having "other symptoms" of the menopause, 37 per cent had complete relief of symptoms, 60 per cent were improved and only 3 per cent failed to improve. It should be recalled that treatment other than stilbestrol was carefully avoided in this group, whereas in the arthritic group supportive measures were encouraged.

In regard to the toxic or unpleasant side effects, 17 per cent complained at some time during the period of observation. Nausea was by far the most prevalent complaint. This occasionally was accompanied by vomiting and abdominal cramping. One patient developed a mass in her breast during the course of therapy, which was revealed to be a benign cyst by microscopic examination. Of those who complained of gastrointestinal symptoms all but 6 patients were able to resume the drug when an enteric coated tablet was used and the dose restricted to 1 mg. or below. Not one of the gastrointestinal symptoms exhibited by those patients was more than unpleasant except in those 6 patients, among whom it was finally discontinued.

These facts, if later substantiated by other investigators, add evidence that a lowered amount or absence of the estrogenic hormone is capable of producing, by some means, rheumatic disease.

In spite of the fact that stilbestrol when given orally controls the symptoms among a comparatively large group of patients suffering from menopausal arthritis and that this drug offers a substantial reduction in the cost of treatment for these patients, one is necessarily cautious in recommending its commercial availability when one thinks of a woman entering a pharmacy and blandly ordering a dozen stilbestrol tablets for her aching knees or hot flashes when possibly there exists in her breast or cervix a malignant carcinoma.

Discussion

Dr. C. H. Slocumb, Rochester, Minn.: Stilbene derivatives do not produce the same results in treating rheumatoid arthritis as those obtained in climacteric arthralgia. Most of the patients with rheumatoid arthritis who have been given theelin or stilbestrol at our clinic noticed no effect on their arthritis, although 2 patients did notice improvement. One patient was given large doses of theelin with marked subjective and objective improvement in her arthritis during a two months period. Within a week after the administration of theelin was stopped, the rheumatoid arthritis was worse. This same cycle of improvement during treatment and return of symptoms after stopping the injection of theelin was repeated during a second series of injections. The other patient had considerable relief of symptoms during pregnancy, but following delivery her rheumatoid arthritis became much worse. Stilbestrol was then given in a dosage of 0.5 mg. daily, during which time she noticed definite relief of symptoms from the arthritis. When the stilbestrol was stopped the arthritis again became worse. I am much interested in Dr. Ishmael's report that the stilbene derivatives have much better effect on the climacteric arthralgias than we have seen in rheumatoid arthritis.

Dr. Russell L. Cecil, New York: I cannot understand why some question has been raised as to the propriety of speaking of menopausal arthritis. I do not see why there is any objection to using the term menopausal arthritis or arthralgia. We see it frequently in young women who have had a hysterectomy and are otherwise perfectly healthy. Following hysterectomy they develop pain in the muscles and joints with no other symptoms, and if we do not call it postmenopausal arthralgia I do not know what else to call it.

Dr. J. Albert Key, St. Louis: I am impressed with the fact that patients with so-called degenerative joint disease for years, stiffness in their joints so they wake up in the morning with fingers feeling tight and swollen, are amenable to therapy with the hormones. The more one studies these cases the more is one impressed with the endocrine factor in the production of symptoms and the analogy of the so-called degenerative joint disease. I believe it is the most important factor we have to deal with in the handling of these patients.

Dr. S. J. Lang, Evanston, Ill.: The stilbene derivatives are unquestionably superior to other oral preparations for the control of menopausal symptoms. Joint pains arising during menopause are at times relieved by the use of estrogenic substances. There is, however, considerable doubt that any of these preparations operate in a specific manner. It is much more likely that they lessen the hyperesthesia and the hypersensitivity which often accompany the menopausal period. I have used stilbene derivatives (stilbestrol) in a few cases of climacteric arthralgia and find them as effective in relieving the symptoms as are the estrogenic preparations used parenterally.

Dr. H. M. Margolis, Pittsburg: Have any toxic reactions from the use of stilbestrol been observed?

Dr. William K. Ishmael, Oklahoma City: To answer Dr. Margolis, toxic reaction is probably the chief objection to this drug. Seventeen per cent complained of nausea. Later we were able to obtain an enteric coated tablet and then only 6 patients in the entire 117 were unable to tolerate it. One breast tumor developed during treatment, which was found to be benign on biopsy. Of the 6 that did not tolerate the drug, 2 did not respond to therapy and were quite ill. Salle reported that in mice death would occur if the doses were carried too high. We must be very careful in its use. I agree that stilbestrol is no better than the natural hormones. Its advantage is that it can be given by mouth and is comparatively inexpensive. Apparently this drug is purely replacement therapy. I have no idea how long it should be continued. I have used it only two years. Many times the patients were older people whose joint pains have come on since the menopause. If it can help in the prevention of degenerative joints it may be of some value.

Current Medical Literature

AMERICAN

The Association library lends periodicals to members of the Association and to individual subscribers in continental United States and Canada for a period of three days. Three journals may be borrowed at a time. Periodicals are available from 1931 to date. Requests for issues of earlier date cannot be filled. Requests should be accompanied by stamps to cover postage (6 cents if one and 18 cents if three periodicals are requested). Periodicals published by the American Medical Association are not available for lending but can be supplied on purchase order. Reprints as a rule are the property of authors and can be obtained for permanent possession only from them.

Titles marked with an asterisk (*) are abstracted below.

Iowa State Medical Society Journal, Des Moines

31:231-268 (June) 1941

The Public's Interest in High Professional Standards. F. P. McNamara, Dubuque.—p. 231.
Treatment of Fresh Burns with Scarlet Red Bandage and Moist Sulfanilamide Dressings. W. E. Gower, Pocahontas.—p. 234.
Intestinal Obstruction in Fourth Month of Pregnancy Due to Adhesions. F. A. Hansen, Red Oak.—p. 237.
Lymphogranuloma Inguinale Venereum: Fourth Venereal Disease. J. P. Sharon, Des Moines.—p. 240.

31:269-372 (July) 1941

Recent Therapeutic Advances and Their Application to Military Needs. S. U. Marietta, Washington, D. C.—p. 269.
Outbreak of Rocky Mountain Spotted Fever. C. F. Jordan, Des Moines, and E. C. Sage, Burlington.—p. 276.
Seasonal Notes on Dog Tick. G. Eddy and C. R. Joyce, Ames.—p. 278.
Notes on Distribution and Breeding Habitats of Iowa Anopheles. J. A. Rowe, Ames.—p. 279.
Malaria Outbreak in Dubuque, Iowa. A. J. Entringer, Dubuque.—p. 281.

Radiology Syracuse, N. Y.

37:131-260 (Aug.) 1941

*Mediastinal and Pulmonary Changes in Erythema Nodosum. L. W. Paul and E. A. Pohle, Madison, Wis.—p. 131.
*Intrathoracic Manifestations of Lymphomatoid Diseases. J. O. Vieta and L. F. Craver, New York.—p. 138.
Roentgen Therapy for Chronic Macrolymphocytic and Mesolymphocytic Lymphatic Leukemia. W. C. Popp and C. H. Watkins, Rochester, Minn.—p. 160.
Further Studies on Radiotherapy of Lymphoblastoma. I. Arons, New York.—p. 164.
Pancreatic Lithiasis. M. H. Poppel and A. H. Levy, New York.—p. 174.
Tetralogy of Fallot: Contrast Visualization of Heart and Great Vessels. A. Grishman, M. F. Steinberg and M. L. Sussman, New York.—p. 178.
Distant Metastases from Carcinoma of Urinary Bladder. H. Greenfield, New York.—p. 181.
Reaction of Kidney Tubules in Tissue Culture to Roentgen Rays. R. Chambers and Gladys Cameron, New York.—p. 186.
*Roentgenographic Study of Relative Incidence of Gastric and Duodenal Ulcer. J. W. McMullen, Denver.—p. 194.
Roentgen Treatment of Experimental Pneumonia in Guinea Pig. C. Fried, São Paulo, Brazil, South America.—p. 197.
Effect of Roentgen Irradiation on Lymphatic Flow in Rats. P. J. Hodes and J. Q. Griffith, Philadelphia.—p. 203.
Intraperitoneal Localized Abscess: Roentgenologic Aid in Diagnosis. J. Levitin, San Francisco.—p. 205.
Simple Calculator for Roentgenographic Mensuration. T. P. Ting, Peiping, China.—p. 208.
Accuracy of Focal Spot Size Determination: Some Theoretical and Practical Considerations. L. G. Jacobs, Indianapolis.—p. 214.
Evolution of Dosimeters in Roentgen Ray Therapy. O. Glasser, Cleveland.—p. 221.

Mediastinal and Pulmonary Changes in Erythema Nodosum.—According to Paul and Pohle, roentgenograms of the chest were had of 20 of 42 patients with a diagnosis of erythema nodosum. Only 1 of the 20 patients was a child. The roentgenograms of 8 were entirely negative for evidence of past or present disease; those of the remaining 12 presented varying degrees of pathologic change. In 1 there was an apical pleural cap with a minimal amount of subpleural parenchymal density. Another patient had typical erythema nodosum in 1932. Roentgenograms were not made at that time. Two years later a tuberculous pleural effusion was followed by parenchymal lesions and positive sputum. The patient received active treatment and at the last report, one and a half years ago, the disease was still active. No roentgenograms were taken at the time of the erythema nodosum, and one can only speculate as to its bearing on the later development of active tuberculosis. It is possible that the erythema nodosum represented the development of allergy to tuberculoprotein and that the pleural and parenchymal tuberculosis was of the reinfection type. The roentgenograms of 1 patient showed only an apical pleural scar. Those of the remaining 9 presented varying degrees of lymphadenopathy of the hilus. Of these 9, 3 had slight but definite degrees of enlargement of the hilus of nodular type and 6 showed moderate to pronounced changes in the shadows of the hilus. From a roentgenologic point of view these patients offered a problem in differential diagnosis. In every instance the primary diagnosis was erythema nodosum and in some the mediastinal changes were not suspected clinically. In only 2 patients was it possible to establish proof of the tuberculous nature of the adenopathy. It is probable that all of them belonged in this category. Lymphoblastoma was the tentative diagnosis in 2 and improvement followed test doses of high voltage roentgen therapy. The patients demonstrate the difficulty of distinguishing between inflammatory and neoplastic mediastinal masses. The coexistence of mediastinal enlargement and enlargement of the hilus or recent erythema nodosum should suggest the nature of the adenopathy, since even in adults such a combination is most likely to be of tuberculous origin. When roentgenograms of the chest of a patient with erythema nodosum reveal adenopathy of the hilus, the tuberculous etiology of the former can be surmised (except in patients who live in areas in which coccidioidiomycosis is prevalent). Therefore roentgenograms of the chest should be made of all patients with erythema nodosum and, even if they are negative, follow-up examinations should be done before the patient is considered to be free from tuberculosis. The knowledge that a patient with nodular enlargement of the hilus and mediastinal nodes has or has had an associated erythema nodosum may make an otherwise difficult diagnosis easier.

Intrathoracic Manifestations of Lymphomatoid Diseases.—Vieta and Craver call attention to the frequency of intrathoracic manifestations of lymphomatoid diseases, particularly of lesions other than the ordinary adenopathies of the hilus or mediastinum. A survey of all the cases with proved pathologic diagnoses seen in the Memorial Hospital from 1917 to 1940, excluding cases lost to follow-up, without roentgenograms of the chest or confirming biopsies, leaves 794 cases with acceptable roentgen and 160 with acceptable postmortem observations. The necropsy material reveals a much higher incidence of intrathoracic lesions than do the roentgenograms. This discrepancy might be reduced by more frequent roentgen studies. In the roentgen analysis of 335 instances of Hodgkin's disease intrathoracic lesions were demonstrated in 74 per cent: the parenchyma was involved in 38.5, the pleura in 7.4 and pleural exudate in 15.8 per cent. At necropsy lesions within the thorax were demonstrated in 88 per cent: the mediastinum or nodes of the hilus were involved in 74, the parenchyma in 47 and the parietal pleura in 29 per cent. Of 239 cases of lymphosarcoma analyzed roentgenographically, 54 per cent showed intrathoracic involvement, 24 of the lung, 10 a thickened pleura and 16.6 per cent pleural effusion. At necropsy in lymphosarcoma enlargement of the nodes of the mediastinum and/or hilus may be expected in 65 per cent, parenchymal lung lesions in 24.5 per cent and involvement of the parietal pleura in 30 per cent. Of 158 cases of lymphatic leukemia for which roentgenograms were had intrathoracic involvement was found in 72 per cent. Fifty-two per cent of these lesions are diagnosed as enlargement of the nodes of the hilus and/or mediastinum, the lung parenchyma was involved in 24.6 per cent, the pleura in 12 per cent and pleural effusion was demonstrated in 12 per cent. The mediastinum or hilus was involved in 83 per cent of 31 cases of lymphatic leukemia that came to necropsy, as was the parenchyma of 19 per cent and the parietal pleura of 6 per cent. Of 52 cases of myelogenous leukemia 82 per cent showed no mediastinal lesions roentgenographically. Discrete nodes at the lung roots were seen in but 9.6 per cent and parenchymal infiltration in only 7.6 per cent. In 23 cases of myelogenous leukemia, necropsy revealed myeloidization of the enlarged nodes of the mediastinum or hilus in 47 per cent, 13 per cent showed lesions in the lung parenchyma and in 52 per cent no lesions of the chest were found. In 10 cases of mycosis fungoides, nodes of the mediastinum or hilus were demonstrable in 10 per cent and

parenchymal infiltration in 30 per cent. One carcinoma of the pancreas and three carcinomas of the colon were found among the one hundred and sixty necropsies. The intrathoracic lesions may be silent clinically with negligible physical signs and symptoms. Only by frequent roentgen examination of the chest can the lesions be detected.

Incidence of Gastric and Duodenal Ulcer.—McMullen attempts to establish the relative incidence of gastric and duodenal ulcer on the basis of 4,400 consecutive gastrointestinal roentgen examinations. Only cases in which roentgen study confirmed the clinical diagnosis were considered. There were a total of 883 peptic ulcerations and of these 689, or 78 per cent, were duodenal and 194, or 22 per cent, were gastric. The literature shows a wide variation from these percentages. Of the 883 ulcers 594 were in men and 289 in women. No decade seemed to be exempt from peptic ulcer. The peak for duodenal ulcer in women was in the fourth decade and for gastric ulcer in the fifth decade. The corresponding peaks for men were the fifth and sixth decades. While roentgen and clinical study is necessarily less accurate than that based on actual observations at necropsy, it does show that a diagnosis of peptic ulcer was made in 20 per cent of the author's material.

Rocky Mountain Medical Journal, Denver

38:681-752 (Sept.) 1941

Chronic Arthritis, with Special Reference to Etiology and Management. P. T. Bohan, Kansas City, Mo.—p. 698.
Treatment of Gunshot Wounds of Head. R. M. Stuck, Denver.—p. 705.
Postoperative Cholangiography. N. F. Hicken, Q. B. Coray and J. F. Orem, Salt Lake City.—p. 709.

South Carolina Medical Assn. Journal, Florence

37:163-192 (July) 1941

Rupture of Varicose Ulcer of Esophagus: Case Report. W. L. McIlwain, J. R. Young, C. H. Young and J. M. Feder, Anderson.—p. 163.
Georgia Medical Association's Proposed Plan for Giving Care to Rural Communities. G. H. Collings Jr., Clemson.—p. 165.
An Unusual Case. V. W. Carpenter and W. M. Carpenter, Greenville.—p. 167.
Dental Root Cyst with Complete Involvement of Antrum. R. F. Zeigler Jr., Seneca.—p. 168.

37:193-232 (Aug.) 1941

*Surgical Treatment of Bronchiectasis. F. P. Coleman and J. G. Seastrunk, Columbia.—p. 193.
Sulfathiazole in Treatment of Childhood Pneumonia. R. M. Pollitzer, J. F. Simmons and I. Yasser, Greenville.—p. 201.
Complications Connected with Treatment of Varicose Veins in Leg. W. H. Prioleau, Charleston.—p. 204.

Surgical Treatment of Bronchiectasis.—Coleman and Seastrunk state that bronchiectasis is present in almost every community. In the adult it is usually of many years' duration and it follows pneumonia associated with the exanthematous diseases, whooping cough, aspirated foreign bodies and other mechanical or inflammatory lesions which interfere with normal respiration. The treatment of bronchiectasis is essentially mass ligation of a lobe or the entire lung in one or multiple stages. The extent of bronchiectasis must be determined roentgenologically before a lobectomy is decided on. The postoperative course of patients subjected to lobectomy performed by the individual ligation technic is remarkably smooth. The temperature seldom rises above 101 F. The patients are usually out of bed in ten days and can be discharged in from thirteen to twenty-seven days postoperatively. Detailed reports of cases are necessary to evaluate the immediate results of the individual ligation technic. The authors performed lobectomy for bronchiectasis by the tourniquet technic in 2 patients and by the individual ligation technic in 10. In the 2 in whom the tourniquet was applied bronchopleural fistulas with an associated empyema developed, and postoperative hospitalization was, respectively, seventy-six and forty-two days. For the patients on whom a lobectomy was performed by the extramediastinal individual ligation technic the average hospitalization was seventeen days. There were no bronchial fistulas or empyemas. Hemorrhage did not occur preoperatively or postoperatively. All the patients subjected to operation are still living. Clinical cures resulted in all except the 2 patients in whom disease of the bilateral lower lobe was present prior to removal of the most seriously involved lobe on one side. These 2 patients show improvement. In addition to these 12 patients, 2 were subjected to total pneumonectomies for bronchiectasis. The 2 patients survived the operation and 1 is well ten months postoperatively. The other patient died one month after discharge from the hospital from an influenzal pneumonia of the remaining lung.

Southwestern Medicine, El Paso, Texas

25:229-274 (Aug.) 1941

Fractures in the Aged. L. W. Breck, El Paso, Texas.—p. 229.
Supportive Measures in Care of Surgical Patients (Transfusion of Blood and Plasma, Parenteral Administration of Solutions and Stimulants). T. H. Seldon and J. S. Lundy, Rochester, Minn.—p. 236.
Sarcoma of Pancreas. H. Shoemaker, Los Angeles.—p. 241.
Modern Management of Pneumonia. R. M. Smith, Dallas, Texas.—p. 250.
Flocculation Tests for Syphilis (Plant Sap Reactions). E. L. Breazeale, T. R. Reusser and J. F. Breazeale, Tucson, Ariz.—p. 253.

Surgery, Gynecology and Obstetrics, Chicago

73:273-432 (Sept.) 1941

Intra-Abdominal Photography in Color. T. N. Horan and C. G. Eddy, Detroit.—p. 273.
Compression of Heart Produced Experimentally. A. Yodice, Buenos Aires, Argentina, South America.—p. 277.
*Infusions of Blood and Other Fluids in General Circulation via Bone Marrow: Technic and Results. L. M. Tocantins and J. F. O'Neill, Philadelphia.—p. 281.
*Acute Appendicitis in Children. E. S. Taylor and R. G. Hodges, New York.—p. 288.
Beneficial Action of Oxygen Therapy in Experimental Shock. J. G. Schnedorf and T. G. Orr, Kansas City, Kan.—p. 301.
Papillary Adenocarcinoma of Kidney: Hypernephroid Tumors. W. C. Stirling and J. E. Ash, Washington, D. C.—p. 305.
Acute Gallbladder. R. R. Best, Omaha.—p. 312.
How to Use Catgut. E. L. Howes, Washington, D. C.—p. 319.
*Prophylactic Implantation of Sulfanilamide in Clean Operative Wounds for Reduction of Postoperative Infections. J. A. Key and T. H. Burford, St. Louis.—p. 324.
Effect of Hard Roentgen Rays on Intestines of Normal Dogs Fed on Inorganic Iron Compounds. Y. K. K'O, C. L. Tu and B. C. Chan, Peiping, China.—p. 333.
Combining Splenectomy with Total Gastrectomy. F. H. Lahey and S. F. Marshall, Boston.—p. 341.
Mucocele of Appendix and Pseudomyxoma Peritonei: Clinical Review and Experimental Study with Case Report. M. Grodinsky and A. S. Rubnitz, Omaha.—p. 345.
Lateral Approach to Diverticulum of Esophagus. J. H. Hershey, St. Louis.—p. 355.
Study of Motility of Intact Uterus at Term. J. K. W. Ferguson, Toronto, Canada.—p. 359.
Study of Bacteriology of Cervix During Pregnancy and Its Relation to Puerperal Morbidity. E. A. Conti, D. L. O'Loughlin, J. W. McMeans and G. S. Lipman, Pittsburgh.—p. 367.
Dacryocystorhinostomy. W. L. Hughes, Hempstead, N. Y.; L. P. Guy and D. W. Bogart, New York.—p. 375.
Atraumatic Amputation Through Lower Thigh (Callander): Modified Technic. F. L. Pearl, San Francisco.—p. 381.
Cyclic Changes in Mammary Gland of Rhesus Monkey: Preliminary Report. H. Speert, Baltimore.—p. 388.
Postpartum Pyeloureteral Changes Following Hormone Administration. S. Lubin, L. S. Drexler and W. A. Bilotta, Brooklyn.—p. 391.

Infusion of Blood and Fluids via Bone Marrow.—The immediate absorption by the general circulation of fluid injected into the marrow cavity of the sternum suggested to Tocantins and O'Neill the use of this route for the rapid introduction of blood and other fluids into the blood stream. The puncture site in adults is either the manubrium or the body of the sternum midway between the angle of Louis and the xiphoid process. In infants or young children the upper portion of the tibia or the lower portion of the femur, at the metaphysis, is preferable. In children more than 3 years of age and in some adults it is preferable that the puncture be made in the manubrium, as its marrow cavity is relatively larger than that of other bones in young children, and in most adults the rate of flow is more rapid in the manubrium than in the body of the sternum. Great caution and but little force are necessary to penetrate the anterior plate of the manubrium in children. Double type needles only from 1.5 to 2.5 cm. should be used, so that the posterior plate will not be penetrated. Several aspirations may have to be tried during the same puncture. Precautions to follow are that no material should be injected unless a blood marrow mixture has been aspirated, care should be taken not to penetrate the posterior plate of the sternum and no solution should be injected until the air from the lumen of the needle

is removed. The authors have given fifty-two infusions to 33 adults and to 7 infants less than 2 years of age. The needle has been left in place for seven minutes to thirty and a half hours. The rate of infusion is governed by the density of the marrow. Rapid rates of injection by means of a syringe are justified only when shock is present. The amounts infused have varied between 50 and 2,000 cc. The manubrium of the sternum was used twenty times, the body of the sternum twenty times and the clavicle twice. The average rate of flow in the manubrium was 3.4 cc. and in the body 3.1 cc. per minute. The same bone has been used as many as three times within four days. Citrated blood, citrated plasma, 5 per cent dextrose solution and physiologic solution of sodium chloride have been infused. Patients who received infusions of blood had substantial rises of hemoglobin and erythrocytes within twenty-four hours. Intramedullary infusion should find its greatest use when rapid absorption of unchanged substances is desired and veins are not available, in widespread burns, mutilations, generalized edema, circulatory collapse, when a poorly developed venous system exists or veins are useless because of repeated punctures or injections of hypertonic solution and when it is not possible to maintain the needle in the vein. In automobile or airplane ambulances and in battle field emergency stations the relative immobility of a needle inserted in a bone might prove a distinct advantage. The method appears to be contraindicated in generalized infections accompanied by bacteremia. No hypertonic or other irritating solutions should be infused through this route. There seems to be little ground for fearing "fat embolism." The marrow selected for infusion must be highly vascular and have the lowest fat content. In such marrow the fluid injected infuses into the blood stream through the nearest veins, disturbing only a small fraction of its fat content.

Appendicitis in Children.—Taylor and Hodges reviewed the records of the 326 children with acute appendicitis who were admitted to the Babies' Hospital between January 1935 and June 1940. Only those patients in whom the primary disease was in the appendix were included. Only 28 of the patients were Negroes. The appendixes of 35.4 per cent of the patients were perforated, and the only 2 deaths of the series occurred among this group. The incidence of perforation was 71.7 per cent between the ages of 1 and 5 years. Difficulties in the communication of symptoms by these patients and in the evaluation of the early physical signs probably partly account for these high figures, but the authors stress that the parents' failure to realize that acute appendicitis may occur in the very young is of greater importance. The factors that influence the mortality and morbidity rate in acute appendicitis in children are, in order of their importance, duration of symptoms before operation, the type of immediate preoperative, operative and postoperative treatment and the age of the patient. The data indicate that there is nothing inherent in acute appendicitis in children that should make the mortality and morbidity rates higher than in adults. The absence of serious concomitant disease in children, particularly of the chronic type, their great recuperative powers and their organic resilience offset the difficulty of obtaining an accurate history and the physiologic anatomic drawbacks. The authors think that their low mortality was the result of immediate operation, routine use of the McBurney incision, simple incision and drainage if removal of the appendix would entail extension of the disease, parenteral administration of fluids after operation to satisfy the unusual demands, free use of whole blood and plasma intravenously to combat protein losses, the use of the indwelling Levin tube with constant Wagensteen suction, the anticipation of ileus and a nonoperative, conservative attitude toward secondary abscesses in the lower part of the abdomen. Chemotherapy is of great value in the treatment of complications unrelated to the disease, e. g. pneumonia. The authors saw little evidence of its benefit in peritonitis of appendical origin.

Sulfanilamide in Operative Wounds.—Key and Burford list a series of one hundred and fifty consecutive clean operations in which sulfanilamide powder was implanted in the wound. It has been shown that a saturated solution of sulfanilamide crystals inhibits the growth not only of susceptible strains of streptococci but of staphylococci and gas bacilli and other organisms not susceptible to the drug in dilute solutions. The efficiency of the drug varies inversely with the number of organisms present. Consequently a clean operative wound, contaminated by relatively few pathogenic organisms, is ideal for the inhibition of the growth of these organisms by the drug to a point at which the patient's defense mechanism can destroy them. Sulfanilamide powder remains in wounds for about forty-eight hours, saturates the fluid in the wound and diffuses into the surrounding tissue. For clean operative wounds much less of the drug is used than for contaminated ones. Rarely more than 5 Gm. is placed in a single wound. It is the impression of the authors that the wounds of their patients healed firmly in approximately the time required for similar wounds without sulfanilamide implantation. Stitch abscesses have been absent. All the wounds healed by primary intention, indicating that sulfanilamide does not interfere with healing. With the exception of the collection of lymph (which later became infected) in one of the wounds, the only postoperative complication was transient fever above 101 F. in 7 patients. There were no local signs of infection. One of the wounds was opened for a short distance but no infection was found. The sulfanilamide may have been partly responsible for the fever, but other than causing uneasiness it did no harm. Similar postoperative fevers have been encountered in patients without infection who had no sulfanilamide implanted in their wounds.

Texas State Journal of Medicine, Fort Worth

37:267-330 (Aug.) 1941

Facts and Fancy About Vitamin A and B Complex Deficiency. F. W. Schlutz, Chicago.—p. 275.
Art of Treating Children. T. A. Tumbleson, Beaumont.—p. 281.
Treatment of Acute Ileocolitis. D. Greer, Houston.—p. 284.
Some Pediatric Therapeutic Suggestions. H. L. Moore, Dallas.—p. 286.
Reappraisal of Prelacteal Feeding. S. Kaliski, San Antonio.—p. 288.
Chronic Nasal Obstruction in Childhood. R. Moore, Dallas.—p. 290.
Duration of Immunity to Diphtheria Following Immunizations. E. G. Schwarz, Fort Worth.—p. 292.
Use of Sedatives in Children. J. E. Ashby, Dallas.—p. 295.
Milk and Appetite. M. R. Woodward, Sherman.—p. 297.
Prevention and Treatment of Skin Diseases in Early Infancy. L. D. Hill Jr., San Antonio.—p. 298.
Administration of Fluids in Pediatric Practice: Why, When, How. J. G. Young, Dallas.—p. 300.
Clinical Evaluation of Use of Immune Human Placental Globulin in Attenuation of Measles. A. Bloxsom, Houston.—p. 302.
Public Health Approach to Control of Diarrhea and Enteritis in Infants. L. T. Cox and L. P. Walter, El Paso.—p. 304.
Relapsing Fever. J. O. Chambers, Fort Worth.—p. 308.
Early Local Treatment of Snake Bite. R. S. Fillmore, Jacksboro.—p. 311.
Necrosis of Skin Due to Sulfathiazole. W. R. Klingensmith, Amarillo.—p. 313.
Osteomyelitis of Skull. F. B. Malone, Lubbock.—p. 314.

Western J. Surg., Obst. & Gynecology, Portland, Ore.

49:419-466 (Aug.) 1941

Maintenance of Normal Basal Metabolic Rate After Thyroidectomy. J. L. DeCourcy, Cincinnati.—p. 419.
One Reason for Failure in Surgical Control of Toxic Hyperplastic (Exophthalmic) Goiter. G. B. Kent, Denver.—p. 423.
Surgical Treatment of Thyrotoxicosis as Related to Geriatrics. T. O. Young, Duluth, Minn.—p. 431.
*Lipocaic in Treatment of Diarrhea of Hyperthyroidism: Preliminary Report. E. C. Bartels, Boston.—p. 439.
Effects of Iodine and of Thyroactivator on Cervical Sympathetic Ganglions and Those of Nodosa of Vagi in Guinea Pigs: Preliminary Report. S. Brock, Chicago.—p. 447.
*Peritonitis: Treatment with Peptone Broth. C. G. Bain, Centralia, Wash., and H. Feagles, Chehalis, Wash.—p. 449.
Clinical Significance of Accessory Bones of Foot. A. Gottlieb, Los Angeles.—p. 452.
Liver Function. E. A. Nixon, Seattle.—p. 454.
Quantitative Test to Evaluate Methods of Hand Sterilization. H. Sears, W. E. Smick, G. C. Schauffler, and R. C. Shoemaker, Portland, Ore.—p. 458.

Lipocaic for Diarrhea of Hyperthyroidism.—Because of similar fatty changes in the livers of depancreatized dogs and in hyperthyroid patients, Bartels gave lipocaic (an internal secretion of the pancreas) to 15 patients with hyperthyroidism to determine what change it would have on the hippuric acid function test. No demonstrable beneficial effect could be ascertained. Six patients with hyperthyroidism suffering from a troublesome diarrhea that failed to respond to the usual measures were given the substance. Three of these patients were extremely

toxic, 1 was in crisis on admission, and the other 3 could be classified as moderately toxic. From six to eighteen capsules of lipocaic were given to them daily. This medication was continued for from three to ten days and discontinued when normal intestinal function was obtained. The function of the 6 patients returned to normal during the course of treatment. All patients were then submitted to hemithyroidectomy or subtotal thyroidectomy. The postoperative course was without accident. The 1 patient who returned for a second stage operation had a recurrence of the diarrhea. Lipocaic therapy was again successful in restoring intestinal function to normal. The value of lipocaic in restoring this function to normal is thought to be that of supplementing the internal secretion of the alpha cells of the depleted pancreas.

Peptone in Peritonitis.—In 1934 Bain and Feagles began to treat all forms of peritonitis with peptone broth. They have treated 150 patients, 8 of whom died. They believe the fatalities were due to blood stream infection established at operation rather than to a progression of peritonitis. This conclusion was borne out by necropsies of several patients. Generally convalescence has been short and free from complications and sequelae. At operation 100 cc. of a 0.8 per cent solution of a nutrient broth in physiologic solution of sodium chloride was poured in before the abdomen was closed or was injected through the drainage tube. Irrigation was carried out through the tube, which was progressively shortened after the first twenty-four to forty-eight hours and which was out completely by the fifth or sixth day. If there was any infection in the incision, broth irrigations were continued. Of the 150 patients 130 had ruptured appendixes. The 8 deaths occurred among these 130. This mortality (6.1 per cent) compares favorably with recently published statistics. The peritonitis of 9 patients was due to acute pelvic inflammatory conditions with or without abscess, 2 to urinary bladder trauma, 4 to perforated peptic ulcer with uneventful recovery, 1 to gun shot wound involving the hepatic flexure and liver and 4 to ruptured intestines due to accident or otherwise. All these patients recovered. The authors believe that peptone broth mobilizes the body defense cells—the reticuloendothelium—or stimulates the production of bacteriophage. The mortality of early peritonitis (i. e. not over twelve hours) with this new method of attack can probably be reduced to the level of abdominal operative procedures generally.

West Virginia Medical Journal, Charleston

37:337-384 (Aug.) 1941

Ureteral Obstruction—Intrinsic versus Extrinsic. R. D. Gill, Wheeling.—p. 337.
Cancer of Stomach. R. H. Walker, Charleston.—p. 345.
Cicatricial (Benign) Stricture of Esophagus Following Vomiting and Intubation: Report of Three Cases. P. P. Vinson, Richmond, Va.—p. 349.
Factors in Chronic Catarrhal Conjunctivitis. L. B. Sheppard, Richmond, Va.—p. 351.
Menstrual Disorders. H. E. Beard, Huntington.—p. 355.
Rehabilitation in West Virginia. R. Kenny, Charleston.—p. 359.
Mobilizing for Better Nutrition. R. M. Wilder, Rochester, Minn.—p. 362.

37:385-432 (Sept.) 1941

Recent Advances in Our Knowledge of Cardiovascular Disease, with Special Reference to Their Clinical Application. W. G. Leaman Jr., Philadelphia.—p. 385.
Head Injuries: Extraglobar Factors Influencing Vision. H. V. Thomas, Clarksburg.—p. 399.
*Ruptured Uterus. J. M. Reese and R. F. Linn, Baltimore.—p. 402.
*Biliary Dyskinesia. F. J. Holroyd, Princeton.—p. 407.
Lead Intoxication in Children from Burning of Battery Casings: Report of Two Cases. C. P. Artz, Grantsville.—p. 410.
Ambulatory Splint for Treatment of Compound Fractures of Humerus, Ulna and Radius. H. A. Swart, Charleston.—p. 414.

Ruptured Uterus.—Reese and Linn report 34 cases of ruptured uterus among the 51,571 cases of pregnancy collected from the records of the University Hospital and the Baltimore City Hospital. The average age of the 34 patients was 33 years, ranging between 19 and 48, and the average parity was 4.67. Nineteen of the women were Negroes; Negro admissions during the period of the study were more numerous than white. There were thirty complete and four incomplete ruptures; 17 patients with the former but none with the latter died. All but 1 of the infants in the complete rupture group were stillborn; this infant died on the second day from intracranial hemorrhage following an internal podalic version and breech extraction. There was 1 fetal death in the incomplete group. Presentation seemed to have some bearing on the occurrence of ruptured uterus; 19 were vertex, 5 breech, 5 transverse and 1 brow, and in 4 the presentation was not designated. The most common etiologic factor of ruptured uterus in the series was internal podalic version and breech extraction; there were 11 cases. A second factor was previous cesarean section; there were 9 instances. A third operative factor appeared to be the use of solution of posterior pituitary in 8. The site of rupture in the women with previous section was through the scar, in 18 of the others it was in the lower uterine segment and in 2 in the fundus; in 4 the laceration was so extensive that it extended through the entire uterus. Usually the diagnosis is simple; the classic signs and symptoms are a severe tearing pain in the abdomen followed by cessation of painful uterine contractions, shock with signs of concealed hemorrhage, absence of fetal heart sounds and fetal movements and change in the contour of the abdomen. Atypical cases are frequent. Once the diagnosis is made, treatment should be immediate; shock should be combated with compatible blood, plasma or hypertonic dextrose solution before any operative intervention is attempted. The surgical procedure of choice is a rapid but careful supracervical hysterectomy with the patient under general anesthesia. Drainage is not necessary unless infection is known to exist. If the patient's condition makes hysterectomy unsafe, the only other satisfactory treatment is to suture the rent in the uterus and then do one of the simpler sterilizing operations. The authors point out that, since blood banks have been instituted at both hospitals, death from shock after rupture of the uterus has been reduced. Prior to the institution of the banks there were 7 deaths among 15 women and only 4 among 19 women seen after their establishment. Good antepartum care with careful study of possible disproportion will help to decrease the frequency of rupture of the uterus. Analgesia to prevent fatigue will lessen the frequency of early intervention in labor and thus will prevent many traumatic ruptures. The use of oxytocics during normal labor cannot be too strongly condemned.

Biliary Dyskinesia.—According to Holroyd, the diagnosis of biliary dyskinesia can usually be made by the characteristic location of pain in the right subcostal region extending around into the right scapular region. At times the pain may be localized in the region of the right kidney. Differentiation from colic due to stones or chronic infection may be difficult and is made by roentgen studies which include the Graham-Cole test and studies of duodenal drainage. The most characteristic symptom of functional biliary dyskinesia is headache. Many patients have had their gallbladders drained or removed without relief from symptoms. A characteristic attack of colic can usually be induced in from five to thirty minutes by the hypodermic injection of 0.01 Gm. of morphine sulfate, which causes a spasm of the sphincter of Oddi and the midportion of the duodenum. Larger doses of morphine will decrease the sensibility to pain but prolong and augment the increase in pressure in the common bile duct. A spontaneous or induced spasm is usually relieved by inhalation of amyl nitrite or by sublingual administration of $\frac{1}{125}$ grain (0.0005 Gm.) of glyceryl trinitrate. As biliary dyskinesia is usually associated with and influenced by chronic atonic or spastic constipation, normal gastrointestinal habits should be developed. The diet should be adjusted according to the patient's weight. The asthenic underweight person should have plenty of uncooked fats to build up his weight and stimulate his probably atonic gallbladder. Weight loss in obese patients often helps their gallbladder to function. The administration of barbiturates and atropine before meals may be useful for mild sedation and symptomatic relief. Taking olive oil before meals or magnesium sulfate before breakfast may lessen the severity of the attacks. Bile salts may be of value in stimulating the liver and possibly relaxing the sphincter of the bile duct. The best drug for the prevention of attacks is 0.00027 Gm. of glyceryl trinitrate taken sublingually every three hours for three days and then after meals and at bedtime for three weeks. This course of treatment produces permanent relief in most cases provided there is no stone in the common bile duct. This treatment may also be temporarily useful in cholelithiasis when surgical intervention is inadvisable because of hypertension, coronary thrombosis, renal disease or advanced age.

FOREIGN

An asterisk (*) before a title indicates that the article is abstracted below. Single case reports and trials of new drugs are usually omitted.

Edinburgh Medical Journal

48:505-576 (Aug.) 1941

Simplification of Blood Examination. W. F. Harvey.—p. 505.
Basis of Temperament. A. N. Bruce.—p. 520.
Value of Tracheobronchoscopy and Esophagoscopy in Diagnosis and Treatment. G. E. Martin.—p. 535.
Studies on Stored Blood: VIII. Effect of Transfusion on Capillary Resistance: Preliminary Note. H. Scarborough.—p. 555.

Journal of Pathology and Bacteriology, Edinburgh

53:1-160 (July) 1941

Physiology of Capsulated Streptococci. J. E. Morison.—p. 1.
Capsulation of Streptococci and Its Relation to Diffusion Factor (Hyalyronidase). D. McClean.—p. 13.
Cervical Abscesses of Guinea Pigs. W. Smith.—p. 29.
Streptococcus Toxin-Antitoxin Flocculation and Its Relation to Rabbit Skin Test. H. Proom.—p. 39.
Bacteriologic Examination of Water Samples, with Reference to Direct and Secondary Incubation at 44 C. L. F. L. Clegg.—p. 51.
Diphtheria Prophylaxis: Modern Methods of Preparing and Assaying Prophylactic Agents, with Note on Essential Nature of Toxoid-Antitoxin Floccules. A. F. Watson, R. A. Taggart and G. E. Shaw.—p. 63.
Solitary Plasmocytoma of Bone. R. A. Willis.—p. 77.
Toxins Produced by Clostridium Welchii in Simple Medium. A. W. Taylor and J. Stewart.—p. 87.
In Vitro Production of Toxin from Strains of Clostridium Welchii Recently Isloated from War Wounds and Air Raid Casualties. Muriel Robertson and J. Keppie.—p. 95.
Intimal Coronary Artery Hemorrhage as Factor in Causation of Coronary Occlusion. M. G. Nelson.—p. 105.
Essential Identity of Klippelfeil Syndrome and Iniencephaly. J. R. Gilmour.—p. 117.
Distribution of Fatty Change in Kidneys and Some Factors Influencing Its Production. J. H. Dible and G. Popják.—p. 133.

Medical Journal of Australia, Sydney

2:103-130 (Aug. 2) 1941

*Concentration of Hemoglobin in Blood of Normal Men. H. S. H. Wardlaw.—p. 103.
Problems in Medical Examination of Recruits. A. B. Anderson.—p. 108.
Medical Examination of Army Recruits. G. R. Troup.—p. 110.
Problems of an Army Medical Examiner. R. J. D. Turnbull.—p. 111.

Concentration of Hemoglobin in Normal Men.—Wardlaw determined the mean hemoglobin content of the blood of 1,512 normal males from 14 to 50 years of age. The material was heterogeneous with regard to race and locality. Most of the subjects were medical students or staff members. There were about 200 normal males of unspecified occupation and 20 soldiers. The results are a mean of that obtained on these 1,512 men by seventeen investigators in eight countries and of determinations made on 77 students and members of the medical school staff in Sydney and 25 adult male aborigines in central Australia. The most frequent values or modes are 15.6 Gm. per hundred cubic centimeters for the collected series and 16.1 Gm. for the Sydney results. The mean values are 15.1 and 16.1 Gm., respectively. The main conclusion to be drawn from the survey is that the means of different groups show a surprisingly restricted variation in spite of the diversity of origin of subjects and of methods employed (15.57 ± 1 Gm. per hundred cubic centimeters of blood). The results give no indication that standards of hemoglobin in blood need be different for different localities (apart from the effect of altitude). A standard figure within the range of the total mean values should be satisfactory. The standard of 15.6 Gm. per hundred cubic centimeters of blood suggested by Haden in 1922 appears more suitable than that of Haldane (13.8 Gm. per hundred cubic centimeters). The necessity for checking colorimetric standards and expressing results as grams of hemoglobin rather than as percentages of a standard figure are emphasized. The mean concentration of hemoglobin in the blood of normal women was found by eleven investigators in eight countries to be 87 (± 5) per cent of that of normal men.

Annali d'igiene, Rome

51:237-308 (April) 1941. **Partial Index**

*Rapid Method (Manzullo) for Bacteriologic Diagnosis of Diphtheria. F. Mulè.—p. 243.

Rapid Method for Diagnosis of Diphtheria.—The Manzullo sodium tellurite test for culturing diphtheria bacilli in three hours was described in THE JOURNAL, Sept. 3, 1938, page 954. Results with the test were reported by Agneti in the *Giornale di clinica medica*, Parma, Dec. 30, 1939, and were abstracted in THE JOURNAL, March 9, 1940, page 931. Mulè compared the results of Manzullo and Loeffler's cultural methods in 130 cases of pharyngeal and rhinopharyngeal diphtheria. He found that Manzullo's method is rapid and more sensitive than the Loeffler method. Manzullo's method of moistening the pseudomembranes with a 2 per cent sodium tellurite solution and making a diagnosis in ten minutes from the darkening of the exudate is not reliable.

Bollettino, Milan

12:57-100 (March-April) 1940. **Partial Index**

*Chromatic Reaction for Tuberculosis. R. Lucchesi.—p. 70.

Chromatic Reaction for Tuberculosis.—The Lucchesi flocculation reaction is performed as follows: A 0.2 per cent hexamethylpararosaniline solution in 95 degree alcohol is prepared. With a graduate pipet 0.05 cc. of tuberculous antigen is placed in a tube to which 0.045 cc. of a 3.5 per cent sodium chloride solution is slowly added. The mixture is poured into a tube containing 0.05 cc. of a 5 per cent benzoin solution and is passed from tube to tube two or three times, after which 0.2 cc. of the hexamethyl staining solution is added. The tube is shaken fifteen to twenty times. The finger tip is punctured with Frank's lancet and blood is withdrawn into a 0.03 cc. graduate pipet. A drop is placed on the concavity of a glass slide, is covered with a drop of a 3 per cent sodium chloride solution, is stirred with a glass rod and is evenly distributed. A drop of the antigen solution is then added and the glass gently rotated in all directions for four or five minutes, after which it is observed under the microscope with a 50 or 60 magnification. The reading of the test is to be made within fifteen minutes under intense natural reflected light. Moderate flocculation giving bluish violet flocculates of small size observable between the blood cells on a uniformly red field indicates a weakly positive result (+), large bluish violet flocculates indicate a strongly positive result (++), and very large bluish violet flocculates indicate a very strongly positive result (+++). The flocculates are easily differentiated from nonspecific particles and are not present when the result is negative (—). The test is rapid, easily performed, inexpensive, sensitive and specific for tuberculosis, the author reports. The results paralleled those of the Meinicke tuberculous reaction in all serums tested by the author with the two methods.

Cuore e circolazione, Rome

25:129-168 (April) 1941. **Partial Index**

*Hypotensive Action of Magnesium Sulfate by Intravenous Route. R. Spinelli.—p. 129.

Hypotensive Action of Magnesium Sulfate.—Spinelli administered intravenously 10 cc. of isotonic and hypertonic magnesium sulfate solutions in a concentration of 7.35 and 25 per thousand, respectively, to 3 persons with normal blood pressure and 8 patients with hypertension. It caused slight transient hypertension followed by considerable hypotension, which was more pronounced when the drug was administered in hypertonic solution. The pressure was lowered about 30 mm. of mercury in patients with hypertension and chronic or subacute nephritis, about 10 mm. in patients with hypertension and arteriosclerosis, and between 10 and 15 mm. in normal persons and in patients with hypertension and aortic insufficiency. The blood nitrogen rose in all of the cases. The author performed experiments in dogs given an intravenous injection of 15 Gm. of urea in 30 cc. of water, alone or with 10 cc. of a 25 per thousand magnesium sulfate solution. The blood pressure was lowered and the elimination of urea retarded. The author concludes that magnesium sulfate produces hypotension which is

proportional to the state of the arteries and retention of blood urea. Best results from the treatment are obtained in nephritis and hypertension when the patients are relatively young and the disease is not of long duration. The dissociated effect of the drug in lowering blood pressure and increasing urea in the blood indicates that retention of urea in the blood is not the cause of hypertension in nephritis.

Wiener medizinische Wochenschrift, Vienna

91:341-366 (April 26) 1941

Rare Antethoracic Esophagoplasty. K. Carsky.—p. 341.
Septic Endocarditis. E. Filo.—p. 344.
*Complications in Monaldi's Suction Drainage. S. Korec.—p. 352.
Detachment and Splintering of Anterior Layer of Stroma of Iris in Glass Blowers' Cataract and Its Diagnostic Value. A. Gala.—p. 355.

Complications in Monaldi's Suction Drainage.—According to Korec, the rare complications during the introduction of the drain are embolism, and hemorrhage caused by the trocar, while insignificant incidents during suction are secondary infection of the tract and hemorrhage due to incorrect position of the drain. Among the more serious complications are pleural detachment with subsequent empyema and a pleuropulmonary and pleuroparietal fistula; progression of the pulmonary processes; severe hemorrhage during suction, and extrapulmonary hematogenous metastases. The author regards the detachment of the parietal from the visceral pleura as the most dangerous complication. He observed 2 patients with this complication, 1 of whom contracted later an extrapulmonary hematogenous metastasis in the form of a gonitis, and subsequently a severe hemorrhage. Progression of the pulmonary process as the result of mechanical irritation by the drain and suction was observed in 1 case during the sixth week of suction. The patient lost his appetite, became weaker and had an increase in temperature. Suction was interrupted. Roentgenoscopy disclosed a widely inflamed area about the cavity, which a few days later progressed to involve the contralateral side. The patient died. The author's aim in calling attention to these complications was not to advise against the suction treatment, but to stress the need of caution. He still thinks that in properly selected cases Monaldi's method is justified and produces noteworthy results.

Zeitschrift für klinische Medizin, Berlin

139:127-258 (April 1) 1941. **Partial Index**

Change of Protein Bodies in Serum of Cancer Patients: Experiences with the Bendien-Love Method. R. Merten.—p. 127.
Detection and Evaluation of Polarographically Demonstrable Changes in Human Serum and Its Filtrates. R. Merten.—p. 133.
Potassium as Tissue Diuretic: Investigations on Diuresis in Cardiac Dropsy. H. W. Bansi and R. Repkowitz.—p. 164.
Influence of Phenobarbital on Oxygen Deficit After Exertion in Heart Disease. H. Goldschmitt.—p. 182.
*Investigations on Etiology of Scarlet Fever. R. Abderhalden.—p. 190.
Diagnosis of Primary Malignant Tumors of Pericardium and of Tumors of Cardiac Wall Infiltrating the Pericardium. P. Jucker.—p. 208.
Sedimentation Speed of Erythrocytes and Environmental Temperature: Acceleration in Presence of Low Temperature and How to Avoid It. M. Sato and T. Otuka.—p. 226.
*Unusual Thromboses During Pregnancy and Their Pathologic Significance. H. Oettel.—p. 248.

Etiology of Scarlet Fever.—According to Abderhalden, scarlet fever patients eliminate ferments in their urine which are able to decompose the protein of hemolytic streptococci that have been obtained in cultures from the pharyngeal smears of scarlet fever patients. The protein of hemolytic streptococci not originating from scarlet fever patients, however, is influenced either slightly or not at all. Patients with nonscarlatinal anginas excrete only such ferments as are able to decompose protein from hemolytic streptococci not originating in scarlet fever patients. The urine of entirely healthy patients contains no ferments capable of hydrolyzing bacterial proteins (hemolytic streptococci, meningococci, influenza organisms). These findings prove that the hemolytic streptococci are significant for scarlet fever and that the protein structure of scarlet fever streptococci differs from that of other hemolytic streptococci. Thus both types can be differentiated with the method which detects protective ferments and it is possible to differentiate scarlet fever angina from ordinary angina during the early stage. After from one to several weeks the excretion of the specific ferments ceases. It may then happen that protein of nonscarlatinal streptococci is decomposed or that both types of streptococci are attacked. The latter observation can be made also at the onset of scarlet fever. Thus the conclusion seems to be justified that the scarlet fever streptococci originate from ordinary hemolytic streptococci. The process is reversible. The author discusses the practical significance of these observations.

Thrombosis During Pregnancy.—Oettel reports two unusual cases of venous thrombosis in connection with gestation. In one patient gestation was complicated by a nephropathy and premature detachment of the placenta. This woman had a thrombosis of the superior vena cava. She exhibited extreme dilatation of the cutaneous veins in the region of the trunk. The other woman had symptoms of eclampsia, anemia and hyperemesis. She acquired a temporary thrombosis of the inferior vena cava. Extensive edema developed in the lower half of the body, particularly in the labia. Thrombosis of the inferior vena cava was deduced from the fact that the edema did not respond to cardiac medication. The author discusses the importance of the liver for protein changes in the blood which are responsible for the tendency to thrombosis in the course of gestation. He is of the opinion that toxic protein bodies act chiefly on the vessels by producing impairment of the intima and a tendency to spasm. Whether a hepatic disorder and toxins of the liver are always involved has not been definitely ascertained, but the substances in question are most likely proteins.

Folia Pharmacologica Japonica, Kyoto

32:103-242 (June) 1941. **Partial Index**

*Observations on Experimental Scurvy. K. Kondo.—p. 192.

Experimental Scurvy.—Kondo investigated the blood changes in guinea pigs fed on a scorbutogenic diet and determined the pharmacologic action of epinephrine in these animals. He found that concomitant with a sudden decrease in body weight, beginning about the end of the second week, severe anemia developed in these animals, as evidenced by the reduction in both cell count and hemoglobin as well as by the appearance of abnormal red cells in the circulating blood. A generalized leukocytosis prevails with relative lymphocytosis; but the blood platelets tend to diminish. The coagulation time of the blood remained stationary. Addition of ascorbic acid to the experimental diet prevented the occurrence of these blood changes, and the animals then maintained their normal body weight. Satisfactory improvement in both clinical symptoms and blood picture could be attained also with the addition of green vegetables to the diet as late as after eighteen days of experimental scorbutogenic feeding. The blood serum of animals with active scurvy is, within one hour after injection into the peritoneal cavity of normal guinea pig, capable of producing leukocytosis, thrombopenia and a reduction in red cell count. This strongly indicates the existence of a toxic substance in the scorbutic serum. No significant alterations in epinephrine sensitivity was noted on the excised portion of intestine of a scorbutic animal as compared with that of a normal guinea pig.

Nordisk Medicin, Stockholm

10:1977-2070 (June 28) 1941

Hospitalstidende

Formation of Calculi in Urinary Tract: Experimental and Theoretical Contribution. Fr. Branner, H. Krieger-Lassen and H. Palm Praest.—p. 1977.
*Development of Cirrhosis of Liver after Acute Hepatitis, Illuminated by Aspiration Biopsy. N. B. Krarup and K. Roholm.—p. 1991.
Hypoprothrombinemia in Leukemia Myeloides. O. Thordarson.—p. 2002.

Cirrhosis of Liver After Acute Hepatitis.—Krarup and Roholm's examinations of 12 cases of grave protracted or recurring hepatitis disclosed a gradual transition from the usual acute hepatitis to fully developed Laënnec's cirrhosis. They assert that decided chronic changes may develop in the course of weeks, but that the cirrhosis formation may also extend insidiously over several years. They advise that chronic hepatitis should be borne in mind when the course of hepatitis is prolonged or when the condition shows a tendency to recurrence. None of the patients in question were addicted to the use of alcohol.

Book Notices

Sulfanilamide and Related Compounds in General Practice. By Wesley W. Spink, M.D., Associate Professor of Medicine, University of Minnesota Medical School, Minneapolis. Cloth. Price, $3. Pp. 256, with illustrations. Chicago: Year Book Publishers, Inc., 1941.

The importance of the sulfonamide drugs in modern therapeutics is reflected in the voluminous literature that has accumulated since the first report on sulfanilamide which appeared in 1936. The author of this volume states that he consulted over one thousand original articles, reviews and monographs in the preparation of the book. The first important textbook on the sulfanilamide drugs to appear was "Sulfanilamide Therapy of Bacterial Infections" by Mellon, Gross and Cooper. Shortly thereafter the authoritative textbook "Clinical Use of Sulfanilamide and Sulfapyridine and Allied Compounds" by Long and Bliss became available. Dr. Spink's volume comes in natural sequence to those previously published.

After disposing of historical considerations and general principles of therapy the author devotes a chapter each to neoprontosil, sulfanilamide, sulfapyridine and sulfathiazole. Ten chapters are given to specific problems in treatment. For example, chapters are devoted to treatment of pneumonia and its complications, treatment of staphylococcic infections, local use of the sulfonamide compounds and use of the sulfonamide compounds in dentistry.

The final two chapters are devoted to the consideration of sulfaguanidine and sulfadiazine. Developments have been so rapid in the field that a book attempting to cover the subject is in danger of being out of date by the time it makes its appearance. Fortunately for this volume the author was able to write the last two chapters just up to the date of publication.

This book provides a thoroughly authoritative discussion of the subject. All through the book the author reveals his critical judgment; he knows when something has been convincingly demonstrated and when reported findings should be taken with a grain of salt. Such critical judgment is particularly essential in this special field. So much has been written and so many unsound deductions have been recorded in the literature that a zealot can find material to prove or disprove almost anything. It is gratifying likewise to find that the author has been careful to weigh the expected benefits of sulfonamide therapy against the possible deleterious effects. For instance, a conservative attitude is revealed in the use of sulfanilamide in the treatment of scarlet fever and tonsillitis.

While the author submits recommendations for the use of the sodium salt of sulfapyridine orally, subcutaneously and intrathecally, he might have done a service by indicating his disagreement with such pointless and possibly injurious use of the drug. The same criticism applies to instances in which the author is merely content to quote an unsound opinion reported by some one else without definitely showing the reader that he disagrees with it.

Despite a few loose ends of this kind, the volume is an important contribution and may be recommended to any one who contemplates using the sulfonamide drugs discussed. The value of the book is enhanced by illustrative case reports and clinical charts that accompany the discussion of specific clinical problems. It is hoped that in subsequent editions the use of sulfadiazine and perhaps sulfaguanidine will be absorbed into the marrow of the volume; but one may also express the hope that the author will have the courage to disregard, as he commendably already has, the numerous unessential proprietary modifications of sulfanilamide and its derivatives that are now beginning to flood the market.

El diagnóstico precoz del cáncer. Por Ricardo Posada, Hijo, jefe de los servicios de cancerología y radium (S. B. P.) en el Hospital Rosales, San Salvador. Cloth. Pp. 147, with illustrations. San Salvador: Imprenta Nacional, 1941.

In many a Latin American country, where so much remains to be done in the way of medical education of both the professional and the layman, this book will be exceedingly useful. For in gathering together his personal experience on malignant disease the author has done it in such a way that the book turns out to be an excellent summarized treatise on cancer. The nonspecialized doctor and the medical student will find in its pages what is basic, clinically, in the diagnosis, and the layman of a certain cultural level will find in its diagrams and photographs how to get an orientation with regard to the disease. The author gives the statistics of his cases observed in the Ministry of Public Welfare dispensary for early diagnosis of cancer. Among 221 patients there were 185 females and 36 males. The most common location was the uterus (44 per cent), next the skin (12 per cent) and in third place the breast (6 per cent). Details are given of treatment used and their results, cancer of the uterus being especially emphasized. However, the main purpose of the book is to stress the importance of the early symptoms, and this is done clearly and thoroughly for each type of cancer. On the other hand there is nothing in the book suggesting the presence in San Salvador Republic of types of disease different from those observed in other countries where the disease is exhaustively studied.

Vitamin K. By Hugh R. Butt, M.D., M.S. in Medicine, F.A.C.P., Consultant, Division of Medicine, Mayo Clinic, Rochester, and Albert M. Snell, B.S., M.D. in Medicine, Head of Section in Division of Medicine, Mayo Clinic. Cloth. Price, $3.50. Pp. 172, with 39 illustrations. Philadelphia & London: W. B. Saunders Company, 1941.

The authors represent one of three groups of investigators which independently of one another showed that the bleeding tendency of patients with obstructive jaundice could be prevented by treatment with vitamin K. They have also played an important part in the demonstration of vitamin K deficiency in connection with certain intestinal disorders. The book gives a survey of their own work in this field, in which they have had considerable clinical experience, and a brief reference to the work of other investigators. It further contains an attempt to give a general orientation about the other problems concerning vitamin K, biologic, chemical and clinical. The parts of the book which deal with the history of the work done at the Mayo Clinic are by far the most detailed. Most interesting to read are perhaps the historical notes of the bleeding tendency of jaundiced patients, dating back to Georg Wolfgang Wedels in 1683. Three hundred and fifty references are collected and, as far as papers in the English language are concerned, the list of publications dealing with the treatment of cholemic bleeding tendency with vitamin K is nearly complete to the date of issue. The other parts of the book are weaker. The work of other authors is sometimes misunderstood on important points or not cited. Several publications appear to be quoted rather haphazardly. Clearcut criticism and stress of the essential points have not been sufficiently applied. The reading of the book leaves the impression that there is a discrepancy between its title and plan and its main object, which is not as much a general survey as an account of the work done by the authors and their associates in a particular though important field of research on vitamin K.

Das Vitamin K und seine klinische Bedeutung. Von Dr. Fritz Koller, Privatdozent für innere Medizin an der Universität Zürich. Mit einem Geleitwort von Professor Dr. W. Löffler. Boards. Price, 6.75 marks. Pp. 151, with 15 illustrations. Leipzig: Georg Thieme, 1941.

The author, a Swiss, is associate professor of internal medicine at the University of Zurich. He has worked in the field of clinical vitamin K investigation since the role of vitamin K in cholemic bleeding tendency became known, and he was the first to describe vitamin K deficiency in adult patients with sprue. Koller's book gives an excellent description of all clinical aspects of vitamin K and also a good explanation of its biology and chemistry. The main object is the critical examination of all the problems which develop in the clinical and pathologic fields more than a detailed account of its recent history. To this purpose the author applies his own clinical material. Methods and means are described in an unusually clear way. One will scarcely find a more efficient account of the use and interpretation of Quick's prothrombin time method than that given by Koller. The vitamin K preparation used by Koller is not methyl naphthoquinone but a water soluble ester of methyl naphthohydroquinone, which is more suitable for clinical use.

The highlights of the book are the careful analysis of the hemorrhagic diathesis in obstructive jaundice and parenchymatous liver diseases and the use of vitamin K treatment for diagnostic purposes. In the description of the hypoprothrombinemia of the newborn the historical part is somewhat incomplete and the author's own material not so comprehensive, but

the way in which the subject is treated is clear and logical. The hypoprothrombinemia of the newborn is ascribed partly to lack of vitamin K in the newborn infant and partly to a transient insufficiency of the liver. The literature list comprises two hundred and sixty-one publications.

Clinical Immunology, Biotherapy and Chemotherapy in the Diagnosis, Prevention and Treatment of Disease. By John A. Kolmer, M.S., M.D., Dr. P. H., Professor of Medicine, Temple University School of Medicine, Philadelphia, and Louis Tuft, M.D., Assistant Professor of Medicine and Chief of Clinic of Allergy and Applied Immunology, Temple University School of Medicine. Cloth Price, $10. Pp. 941, with 27 illustrations. Philadelphia & London: W. B. Saunders Company, 1941.

This word brings together within a single volume the principles of immunology, biotherapy and chemotherapy which bear an important relationship to the management of infections. The clinical correlation of these fields which its scope affords makes the book invaluable to students and teachers of medicine but particularly to practicing physicians. Viewed in this light, the book represents a timely successor to the previous contributions of the senior author "Infection, Immunity and Biologic Therapy" and "Principles and Practice of Chemotherapy." The junior author is perhaps best known for his book "Clinical Allergy."

The present work embraces a discussion of the mechanisms of infection, immunity, anaphylaxis and allergy and the part played by these in the diagnosis, prevention and treatment of diseases. In presenting the subject matter the authors have arranged the text in two parts, part I comprising the general aspects of infection, immunity, biotherapy and chemotherapy and part II the practical applications of these in the prophylaxis and treatment of disease. Each part is conveniently divided into chapters and each chapter has a summary, a feature of particular value to students. Whereas the chapters in the first part of the book are concerned with discussions of the various phenomena of infection, immunologic principles, anaphylaxis and allergy, diagnostic reactions, immunization and biologic and chemical therapy, those in the second part are devoted to consideration of the individual diseases. Such an arrangement increases the usefulness of the text in that both general data and specific data are readily available.

The format of the book is pleasing, and the paragraphs are printed in the conventional textbook style. The use of italics for words which carry a technical definition or interpretation makes for clarity and emphasis of important terms. The nomenclature of infectious agents which is employed is as simple as is commensurate with accuracy and is not confused by use of the less familiar synonyms. The authors and the publisher are to be congratulated for the careful editing and printing of the material that is presented.

As with all publications of this type, the work cannot be expected to be completely abreast of the rapid advancements in the various subjects discussed, which are constantly reported in the current medical journals, particularly the field of chemotherapy in the bacterial infections. The authors have wisely avoided details which are as yet in the experimental stage. Also, while certain opinions expressed may be questioned by some, these for the most part are conservative: the discussions are mainly concerned with a presentation of the facts, enabling the reader to draw his own conclusions. Altogether, this book represents a real contribution as a reference book and may well serve as an authoritative guide to future developments which will undoubtedly be forthcoming in the phases of medicine covered.

Introduction to Psychobiology and Psychiatry: A Textbook for Nurses. By Esther Loring Richards, M.D., Sc.D., Associate Professor of Psychiatry, Johns Hopkins University, Baltimore. Cloth. Price, $2.50. Pp. 337. St. Louis: C. V. Mosby Company, 1941.

Although the author does not claim that this book is written as a textbook on psychiatric nursing, she intends that it should be read by nurses. It is divided into two parts. The first part presents reasons why the personality should be studied and discusses such study by means of the writing of an autobiography, and the author objectifies various aspects which are found in studying the personality. In several chapters on personality evaluation, psychology in a nonpsychiatric sense is touched on, but unfortunately the brand of psychology which is discussed is partially of the author's own making and one finds only superficial resemblances to the accepted psychologies now in use by many clinicians and by most academic psychologists. Too many functions of the brain which are comprehended in a deeper sense today are treated by the author in the manner in which old time "faculty" psychologists used to treat them. The author, for instance, talks about instincts, of constitutional endowments, of emotional-energy equipment, conative processes and parental instincts. Study of these by experimental psychologists and biologists raises the question whether they ever exist in the clear sense in which Dr. Richards tends to imply. She talks about such traits as the capacity of "clear thinking" and the "capacity to systematize." While, undoubtedly, one can segregate certain mental reactions to fulfil the criteria which Dr. Richards brings out, the ideas must be criticized in their lack of conventionality, which would make them more valuable for a discussion by a scientific group than for memorization or learning by a group of nurses. The second part of the book deals with current psychiatric entities such as the psychoses, psychoneuroses and the whole gamut of disorders which are studied by the psychiatrist. Psychobiologic terms are injected in the discussion, which would tend to complicate the work adjustment of any nurse who would intend to work outside the atmosphere of the Phipps Psychiatric Clinic, where these terms had their beginnings and are in current use. The general psychiatric discussions are, however, basically sound, though brief. There are excellent and detailed descriptions of the symptomatology and progress of characteristic cases. The treatment programs are not given much space, nor are any discussions of the nurse's responsibility with regard to caring for each kind of patient. The book is lucidly written, is interesting and, except for the criticisms suggested, should prove to be a useful addition to the nurse's library.

Essentials of Endocrinology. By Arthur Grollman, Ph.D., M.D., Associate Professor of Pharmacology and Experimental Therapeutics in the Medical School of the Johns Hopkins University, Baltimore. Cloth. Price, $6. Pp. 480, with 74 illustrations. Philadelphia, Montreal & London: J. B. Lippincott Company, 1941.

Little is known but much is written about endocrinology. The purchasing physician has been disappointed so many times that he should be pardoned if he examines a new book in this field with a critical eye. Grollman is a full time laboratory worker who apparently has had little contact with patients. His laboratory work has been limited to specialized fields; in this book there are but a half dozen references to his published papers.

The preface indicates that he believes that "clinical endocrinology is frequently befuddled by accepting unproved assumptions as basic facts and building upon the insecure foundations thus established a maze of fanciful and ill founded conjectures." This book contains a cursory discussion of almost everything even remotely connected with the endocrine glands. The reader is relieved to learn that "other ductless glands (the tonsils, glomus coccygeum, etc.) are also excluded." None of the sciences are neglected. There is a discussion of the embryology, gross anatomy, comparative anatomy, histology, pathology, physiology and pharmacology of each gland plus a clinical discussion with recommended treatment for endocrine disturbances.

When he reads the clinical discussions in this book the medical reader is likely to find himself becoming annoyed. By what right does the author presume to help him with clinical diagnoses and suggest treatment for patients? How much experience has he had in the diagnosis and treatment of goiter to permit him to write the following advice: "The patient should receive ample sedation (phenobarbital) on the evening prior to the operation as well as the usual dose of morphine the following morning. The use of a basal anesthetic (avertin) is advisable. Thyroidectomy should be performed by a skilful operator with the attendance of a competent anesthetist. Local or the less devastating general anesthetics (ethylene or cyclopropane) should be employed. Postoperatively, glucose and saline infusions are indicated."

What experience permits the author to make the following observations? "The diagnosis of moderate or severe diabetes usually entails no difficulties. The presence of marked glycosuria, a highly elevated blood sugar and acidosis are pre-

sumptive evidence of the existence of the disease and require immediate treatment." It will prove helpful to learn that "In the differential diagnosis of diabetic coma, one must keep in mind the fact that coma may also be due to hypoglycemia, acute infections in children, meningitis, uremia, brain tumor, cerebral accidents, etc. A simple test with Nessler's reagent makes possible the demonstration of acetone in the expired air in case of diabetic coma."

It was hoped that more reference would be made to the contributions of the author's clinical colleagues in the treatment of Addison's disease, yet the crisis of this disease rates only nine lines.

From a therapeutic point of view this book is without value.

Doctors Don't Believe It—Why Should You? Facts and Fallacies About Health with Practical Guidance for the Layman. By August A. Thomen, M.D. With introduction by Logan Clendening, M.D., and the Right Honorable Lord Horder, Physician in Ordinary to the King of England. Cloth. Price, $2.50. Pp. 384. New York: Simon & Schuster, 1941.

This volume is offered as a two in one health book, representing an exposé of facts and fallacies concerning health combined with facts and figures which provide the scientific bases and further instruction as to the prevention and treatment. The title of the volume is, of course, extraordinary, but the publishers report that it was selected by a group of advisers who were given their choice among several titles. In many ways the title is not at all applicable to some of the material contained. For instance, it is hard to read an item entitled "What Is Trichinosis?" and find in it anything which is covered by the title "Doctors Don't Believe It." Nothwithstanding these minor considerations the book offers much important material expressed in a form that is easily readable. It is divided into a series of chapters covering food, diet and weight reduction; your daily life; major ailments; the venereal diseases; cancer; the common cold; allergy, asthma and hay fever; minor ailments and remedies; mind and senses, and birth, marriage and death. The author has obviously collected his material from many sources and offers a partial bibliography. The book is not absolutely complete or up to date in some particulars, but modern medicine moves so rapidly that few books really are. In general the book is one which can be recommended to all those interested in the assembling of information regarding health and hygiene.

The Nineteen Forty Mental Measurements Yearbook. Oscar Krisen Buros, Editor. Cloth. Price, $6. Pp. 674. Highland Park, New Jersey: Mental Measurements Yearbook, 1941.

This large volume is the fifth of a series of books put out by the Department of Education at Rutgers University. These handbooks have been appearing biannually, and the present volume is a climax, for it is several times larger than the previous volumes in the series. There is little that is original in the volume, for it consists of an alphabetical listing of (1) intelligence, achievement and other educational and psychologic tests and (2) books which have to do with testing and the examination of the individual. The material included may have appeared prior to 1938, but most of it came out during the years 1938-1940. Each test is serially numbered, but the numbers begin not with 1 but with 1182, which follows 1181 in the previous Mental Measurements Yearbook. The book review serial numbers also begin where the previous issue left off. This is not a defect but merely keeps the listings consecutive with those of previous years. Each test is followed by rather extensive quotations from reviews which have appeared elsewhere. The reviews from THE JOURNAL and others having to do with medical, psychologic and educational matters are carefully culled in order to give as good evaluation as possible of the test materials. Psychologists wishing to learn about any test are, by use of this guide, in rather a good position to determine which one would be useful for a special purpose, provided they bring to bear on the problem the special training which the psychologist must have in evaluating his test equipment. A physician might find himself at a disadvantage in using the book because of the knowledge of psychologic literature, personalities and technics for which it calls. There is an extensive introduction, which is interesting because it evaluates the opinions of reviewers, editors, test publishers and others relative to the validity of the reviews published in previous numbers. Periodicals are also listed alphabetically with their publishers and other important data, and the reviews coming therefrom are indexed under the listing of each periodical. There are extensive indexes covering both subjects and names; all in all, to those interested in mental testing, this is a most useful and comprehensive work.

Lachende Medizin. Worte und Scherenschnitte. Von Irene Schleicher. Boards. Price, 3.38 marks. Pp. 164, with illustrations. Leipzig: Georg Thieme, 1941.

The title of the book means "Laughing Medicine," but the reviewer did not even smile once while perusing it. No doubt the medical profession offers the humorist much material. Many of the best satirical poems about physicians were written by physicians, e. g. Oliver Wendell Holmes and Kussmaul. In order to make people laugh at a group of persons or a human institution, it is not sufficient, however, to bring platitudes into verses; one must have some gift of humor or irony. It is not humorous in itself to say that a "badearzt" (physician in a spa) likes to earn money and longingly waits for the summer guests. And a whole poem about specialists, as written in this book, says much less than the famous definition "A specialist is a man who knows more and more about less and less." From a purely literary point of view, the verses are outright bad, although the German language has been mistreated in the interest of the rhythmic form. With respect to the illustrations, the reviewer, who is no critic of art, feels that they do not enhance the humorous character of the book.

Fatigue and Hours of Service of Interstate Truck Drivers. By Benjamin F. Jones, Passed Assistant Surgeon, et al. From the Division of Industrial Hygiene, National Institute of Health. Prepared by Direction of the Surgeon General. Federal Security Agency, U. S. Public Health Service. Public Health Bulletin No. 265. Paper. Price, 40 cents. Pp. 286, with illustrations. Washington, D. C.: Supt. of Doc., Government Printing Office, 1941.

The Interstate Commerce Commission under the Motor Carrier Act, 1935, is attempting to discover the relationship between hours of service and safe operation of vehicles. In the absence of existing factual information, the commission requested the U. S. Public Health Service to establish, if possible, at what measurable point fatigue of the cumulative type makes a truck driver a traffic risk. Data are compiled in the report based on several methods of estimating fatigue—subjective sensation of the driver himself, trained observation by physicians and others, and a series of performance tests based on physiologic and pathologic principles. Dependable correlation was observed in the case of speed of tapping, manual steadiness, simple reaction time and reaction-coordination time. These tests, therefore, were used as one basis for scoring results of observations. Physical examination alone apparently is not especially helpful. The present evidence affirms the common impression that limitation of driving hours will reduce fatigue, will improve efficiency of drivers and will contribute to highway safety.

Doctors Anonymous: The Story of Laboratory Medicine. By William McKee German, M.D. With an introduction by Paul de Kruif. Cloth. Price, $2.75. Pp. 300. New York: Duell, Sloan & Pearce, 1941.

That passion for anonymity ascribed to pathologists in general is not characteristic of the author, who seems rather to be guided by the Arabic proverb "He that bloweth his own horn assuredly knoweth that it is well blown." His description of various laboratory methods of examination and his exposition of their significance in diagnosis and treatment might be a valuable contribution to the education of the laity were is not disfigured by reiterated, wholly unnecessary, slurs on his clinical colleagues and sneers at the ethics of the profession. The work is further marred by such gross errors as the statement that in 1876 in hospital obstetrics one third of all mothers died of puerperal fever and that the medical profession was satisfied with its 149 hospitals, that Crawford Long practiced in Alabama, that the American College of Surgeons requires 15 per cent necropsies or that the American Medical Association in 1939 approved 6,166 hospitals. One cannot but wonder whether the author's diagnostic reports are equally unreliable. The chapter on "Coroner's Thrombosis" may be commended without reserve.

Queries and Minor Notes

THE ANSWERS HERE PUBLISHED HAVE BEEN PREPARED BY COMPETENT AUTHORITIES. THEY DO NOT, HOWEVER, REPRESENT THE OPINIONS OF ANY OFFICIAL BODIES UNLESS SPECIFICALLY STATED IN THE REPLY. ANONYMOUS COMMUNICATIONS AND QUERIES ON POSTAL CARDS WILL NOT BE NOTICED. EVERY LETTER MUST CONTAIN THE WRITER'S NAME AND ADDRESS, BUT THESE WILL BE OMITTED ON REQUEST.

INCIDENCE OF CORONARY THROMBOSIS BY OCCUPATION

To the Editor:—**Could you inform me as to the incidence of coronary thrombosis among white men doing manual labor as compared with those in confined occupations such as executive work?**

T. E. Wilson, M.D., Jackson, Miss.

ANSWER.—There have been several notable studies on the incidence of coronary artery disease according to occupation. One of the earliest comprehensive studies was that made by Levy, Bruenn and Kurtz (*Am. J. M. Sc.* **187**:376 [March] 1934). Their data, based on autopsy material, showed no significant preponderance of coronary disease among professional and executive persons. Master and his colleagues (*Am. Heart J.* **18**:434 [Oct.] 1939) likewise find no difference in the incidence of coronary artery occlusion in three broad occupational groups: (*a*) workers and laborers, (*b*) clerks and business men, (*c*) professional workers. Unfortunately, their records did not routinely give sufficiently detailed information to separate out the executives in group *b*, but the substantial agreement between proportions of men in these three categories described among Master's patients and in the general population supports their conclusion that there are no marked occupational differences in coronary occlusion. Hedley (*Pub. Health Rep.* **54**:972 [June 9] 1939) has analyzed data on acute coronary occlusion in Philadelphia during 1933-1937. He distinguished four groups

Estimated Mean Annual Death Rate per Hundred Thousand in Specified Age Period

	35-44 Yrs.	45-54 Yrs.	55-64 Yrs.	Total 35-64 Yrs.
Group a	47	109	475	154
Group b	37	150	304	140
Group c	36	147	357	128
Group d	29	124	253	107

of men: (*a*) professional men, (*b*) proprietors, managers and officials, (*c*) clerks and salesmen, (*d*) workers, all classes in this material and on the basis of estimates of the male population in the corresponding groups, has computed death rates from coronary occlusion in these groups, with the results shown in the accompanying table. Dr. Hedley's data relate to white men. While they show a higher rate in the professional and executive groups, the data are by no means free from the defects associated with diagnosis to which earlier reference has been made. Both Master's and Hedley's articles review the literature, and other references on the relationship between occupation and incidence of coronary thrombosis will be found in their papers. Another source of data which will be useful is the volume "Occupational Mortality" (published by His Majesty's Stationery Office, London, 1938) which is part IIa of Registrar General's Decennial Supplement, England and Wales, 1931. The chapter by Dublin in "Diseases of the Coronary Arteries and Cardiac Pain," edited by R. L. Levy (New York, Macmillan Company, 1936) may be consulted also.

GALVANISM FOR HEMORRHOIDS

To the Editor:—**I have recently heard of the treatment of hemorrhoids and especially external hemorrhoids by the use of galvanism. Results are said to be excellent. I have not been able to find any literature on the subject. Has such a method of treatment ever been reported? If so, please give references.**

M.D., Massachusetts.

ANSWER.—This query can be best answered by quotations. Warren R. Rainey of St. Louis, on page 2347 of "Modern Medical Therapy in General Practice" (edited by David P. Barr, published by Williams & Wilkins Company, Baltimore, 1940), states: "The use of galvanism in the treatment of hemorrhoids consists of exposing the hemorrhoid through a speculum and inserting a needle electrode into the upper part of the pile. The positive pole is connected to the needle and the negative pole is connected to a moist pad either strapped to the abdomen or placed below the hips of the patient. The current is turned on gradually to 10 to 15 milliameters. After about fifteen minutes the hemorrhoid distends and becomes black. One or two treatments a week can be given. The procedure, although carried out for a number of months, has failed to give satisfactory results in the author's experience."

Frank H. Krusen in "Physical Medicine" (published by W. B. Saunders Company, Philadelphia, 1941), page 337, states: "In the past, the galvanic current has been employed to a considerable extent for destruction of various buccal, vaginal and rectal lesions. Today it is rarely used for such purposes. For example, in 1934, Kallet reported that a survey conducted by the American Proctological Society indicated that employment of the constant current in the practice of proctology is very unsatisfactory and does not, as a rule, produce as good results as do other simpler methods of treatment. It is now generally believed that the procedure is not satisfactory as a treatment for hemorrhoids, although the procedure formerly had a number of advocates."

DIATHERMY BURNS

To the Editor:—**Last June I treated a woman with diathermy by placing a pad on the back and one on the lower abdomen. She complained of a great deal of pain in the lower abdominal wall after the treatment and claimed that she sustained a burn. At no time was there even a blister or any scaling of the skin. There was, however, a redness of the skin after the treatment and later an area that had a slightly blanched appearance, and this was somewhat indurated. It was felt that she magnified any symptoms she might have. Can you give me an explanation as to what took place in the abdominal wall? Is it possible to get a burn of the deeper structures of the abdominal wall under such conditions without having a blister or slough?**

M.D., New York.

ANSWER.—In the administration of medical diathermy it is not believed possible to create a burn in the deep tissues without a burn of the skin. After the described treatment there was redness of the skin and an area with a blanched appearance and induration. This might have been the preliminary evidence of a diathermy burn. If it was, in three to seven days there would be a necrotic area with a slowly separating slough.

More than four hundred experiments have been made in testing deep tissue temperatures on animals and dogs. In animals burns have been produced to measure the tissue injuries and the deep tissue temperatures. It has been concluded that when a limb is exposed to short wave diathermy the results indicate that the temperature of its tissues decreases from the skin, which is nearest the source of energy, toward the marrow of the bone. This thermal gradient from the surface to the interior of the limb is convincingly demonstrated by the fact that when the dosage was excessive the histologic damage of the tissues manifested a similar gradient of injury from the skin to the bone. This confirms previous observations on human subjects in which the temperature at different depths in the tissues from the skin to the periosteum has been determined after exposures of the thigh to short wave diathermy.

ULCERATIONS OF LEG IN DIABETES

To the Editor:—**An elderly woman with diabetes of long standing had an amputation because of diabetic gangrene. On the remaining lower extremity there are two ulcers, one on the small toe and one on the large toe, which have been present for at least five months and have become somewhat larger. The diabetes is under control. The toes are bluish and slightly edematous. At present she is applying sulfanilamide powder directly to the ulcer and a continuous wet boric acid compress over it. The leg is kept under a baker, and peripheral vascular pressure is applied four times daily for one hour each time. The dorsalis pedis cannot be felt. I am naturally worried about gangrene setting in. Can you suggest any other form of treatment or medication to heal these ulcers?**

M.D., New York.

ANSWER.—The ulcers in question are undoubtedly due to gross deficiency in blood supply to the extremity, as evidenced by the bluish color, absent dorsalis pedis and loss of the contralateral leg. Apparently acute infection is absent. The local application of sulfanilamide powder and boric compresses probably are of value from a prophylactic standpoint. Saturated magnesium sulfate compresses would be somewhat preferable to reduce the edema.

Unless a boot for passive vascular exercise is available there is no further treatment of value and the prognosis is poor. Amputation of the affected toes might be successful in the hands of a surgeon with much experience in this field, but the risk of infection and gangrene in the stumps must be considered. There is even more risk under the present conditions in the foot. Extreme caution not to burn the foot must be observed.

ULCERATIVE COLITIS

To the Editor:—A 9 year old boy has had chronic ulcerative colitis intermittently over a period of three years. Recent attacks have been associated with an acute respiratory infection. The attacks in the past have cleared up a month or so after the cessation of the respiratory infection. The patient was given sulfathiazole, a preparation of pectin and colloidal kaolin together with a high vitamin, high protein, low fat diet. General ultraviolet irradiation has also been used. The present attack began in March after an acute otitis media. Staphylococcus aureus was isolated from the affected ear. Roentgen ray examination of the chest was negative. Examination of the colon by means of a barium sulfate enema was reported negative for ulceration. Proctoscopic examination failed to visualize ulcers. Culture of the smear taken at the time of the proctoscopy showed a nonhemolyzing streptococcus, presumably Streptococcus faecalis. A recent blood examination showed 70 per cent hemoglobin, 4,188,000 red blood cells, 8,000 white blood cells, 58 per cent polymorphonuclears, 46 per cent small lymphocytes, 6 per cent eosinophils, with slight variation in size and shape of the red blood cells. The blood level of sulfathiazole at this time was 1.3 mg. per hundred cubic centimeters. On this date the patient had taken a total of 300 grains (20 Gm.) of sulfathiazole. The drug was discontinued three days later because of a febrile reaction and an increase in the number of stools. After three days the temperature returned to normal and has remained so. I have continued with the high protein, low residue, high vitamin diet, ultraviolet therapy and bed rest. The patient is having four to five loose, foul smelling, brownish stools a day. He has good appetite but tires easily. There is practically no pain attending the movement. The blood count on May 10 showed 75 per cent hemoglobin, 4,680,000 red blood cells, 10,200 white blood cells, 59 per cent polymorphonuclears, 37 per cent small lymphocytes, 2 per cent mononuclears and 2 per cent eosinophils. Sulfaguanidine therapy was considered. A survey of the literature would indicate this drug to be more effective in the acute febrile stage of dysentery. I obtained a supply of this drug for experimental use with the explicit understanding that the patient be hospitalized and daily examinations made of the blood and urine for detection of leukopenia, anemia or hematuria. I should like to have your opinion as to the treatment of chronic ulcerative colitis in general and as to the use of sulfaguanidine in this particular case. M.D., New York.

ANSWER.—As far as is known there are no methods available for a diagnosis of "chronic ulcerative colitis" except by visualization of lesions through the proctosigmoidoscope and by evidence obtained from roentgenologic examinations. It is clearly stated that the examination failed to reveal any lesions by either of these methods. One might ask then how a diagnosis of "chronic ulcerative colitis" was made. The various medications which have been used are some of those employed in the treatment of some forms of ulcerative colitis. Failure to respond to any of them might substantiate the suggestion that some other form of intestinal trouble is responsible rather than an ulcerative colitis. There are many other intestinal dysfunctions besides ulcerative colitis which are associated with a diarrhea such as is described. Sulfaguanidine has been used successfully in some forms of ulcerative colitis but would hardly seem justified without an accurate diagnosis of the nature of the intestinal disease at hand. A publication by Drs. H. M. Weber and J. A. Bargen, "Forms of Ulcerative Colitis," gives the most recent information on the classification of the various forms of ulcerative colitis.

PROBABLE PERNICIOUS ANEMIA

To the Editor:—A woman aged 71 presented, five years ago, a blood picture of 30 per cent hemoglobin (Sahli) and 2,400,000 red cells. There was increasing fatigue but no subjective or objective symptoms of pernicious anemia. On treatment with antianemia preparations by mouth she improved month by month, the hemoglobin rising to 70 per cent and red cells to 3,600,000 in eight months. Since then she has had a variety of iron and liver oral preparations, plus some injections of liver extract. At no time has the hemoglobin risen over 81 per cent or the red cells over 4,100,000. During the last year treatment has been chiefly ferrous sulfate, 5 grains (0.3 Gm.) three times a day. For the last six weeks the ferrous sulfate has been 30 grains (2 Gm.) daily. A recent red count shows hemoglobin 77 per cent, red cells 3,400,000 with a number of macrocytes and a few microcytes. The blood films have been inconclusive. There have been some macrocytes but no nucleated cells, no stippling or definite variations in shape. She feels well, and careful questioning reveals no symptoms of pernicious anemia, chronic blood loss, or systemic or focal disease. This seems to be an obscure or mixed type of anemia. No reticulocyte counts have been done. Can you classify the type? Are there any suggestions for diagnostic investigation? Would a trial course of intensive parenteral liver therapy be advisable? Would hydrochloric acid by mouth be helpful? M.D., Iowa.

ANSWER.—From the evidence available, the most likely diagnosis is pernicious anemia. In favor of this are the age of the patient, the presence of rather severe anemia which apparently responded to liver therapy, and partial relapse after liver was discontinued. The low color index seen originally may have been due to an associated iron deficiency.

If the patient has pernicious anemia, one would expect to find anacidity following histamine stimulation and an increase in the mean corpuscular volume. As an early sign of neural involvement is decreased vibration sense in the lower extremities; this should be carefully tested.

For a therapeutic test, one might give 1 cc. of concentrated liver extract (15 U. S. P. units) intramuscularly once a week for about six weeks. If the red count increases to over 4 million this would be further evidence in favor of pernicious anemia. For maintenance, an injection every two weeks is usually sufficient. If the red cell count does not increase, the patient probably does not have pernicious anemia. In such an event thorough hematologic investigation is indicated (Osgood, E. E.: Laboratory Diagnosis, ed. 3, Philadelphia, Blakiston Company, 1940, p. 187).

As the patient is past the menopause and there is no chronic blood loss, further iron therapy is not necessary. Hydrochloric acid by mouth would not influence the blood picture.

MACULAR CHOROIDITIS

To the Editor:—Please give the most recent opinions as to the etiology and therapy of macular choroiditis. M.D., Pennsylvania.

ANSWER.—A special etiologic study of macular choroiditis has never been made, as far as has been determined, but in general the same causes which operate to produce endogenous uveitis in the anterior segment should be effective in the posterior, including its most vascular and highly metabolic part, the macular choroid. However, the fact that the iris and the ciliary body are in constant motion as are the heart, the lungs and the joints, and that the choroid is not may explain why many cases of fibroplastic iridocyclitis are seen and but few of exudative choroiditis.

Syphilis and tuberculosis are about the only well established causes of choroiditis. Vitreous opacity often makes it difficult to tell whether the lesion is primarily in the retina or the choroid in the early stages, and after a central choroiditis has taken its course the pigmented atrophic scars look just the same ophthalmoscopically as do those produced by the stretching and tearing of the choroid in so-called central myopic choroiditis. Salzmann has always taught that the one cannot be told from the other anatomically.

DERMATITIS FROM GOLD THERAPY

To the Editor:—What is the treatment for eczema following the use of sodium gold thiosulfate for arthritis in a woman 62 years of age? Her arthritis has improved. The eczema is most persistent behind the ears, where the scalp has remained dry and scaly. Other parts involved are the submammary and inner thigh regions. M.D., Pennsylvania.

ANSWER.—The condition described is more commonly called dermatitis than eczema. It would be interesting to know what dosage was employed for the patient. It has been shown that following gold therapy the gold salt is excreted slowly. This helps to explain the persistence of such an eruption. Certainly, the use of further gold therapy would be contraindicated.

As a rule, it will be found that emollient measures best serve the purpose in an eruption of this type, e. g. the use of boric acid ointment 5 per cent in petrolatum and hydrous wool fat.

Moreover, irradiation therapy by an expert is often of value in an eruption of this type; e. g., the use of the roentgen ray in a dose of 50 to 75 roentgens, unfiltered, to the areas involved once a week or once in two weeks for a series of three or four treatments may be all that is necessary to clear up this process, of course, using the local therapy in addition.

It has also been found that patients that have been on gold therapy are rendered photosensitive, so that the patient should be cautioned about getting out too much in the sun, at least for the next month to six weeks.

SIMPLE GLAUCOMA

To the Editor:—What is the latest approved medical or surgical treatment for simple glaucoma? M.D., Illinois.

ANSWER.—Each case of simple glaucoma is different from any other, and the treatment in each case depends on the reaction and tolerance of the eye in question. The first step is a careful recording of the three factors on which subsequent steps must be based; namely the central field of vision, the peripheral field of vision and the central visual acuity. The next step consists in the use of miotics as weak and as infrequently as is required to keep the tension within the range of the so-called normal. This calls for frequent measurements of intraocular tension, preferably at three hour intervals for several days. After the determination has been made as to the strength and frequency of use of miotics required to maintain a flat level curve of tension, the three vital factors should be measured at intervals of three to six weeks. As long as they can be maintained without loss, the treatment with miotics may be continued; but as soon as a deterioration occurs the miotics must be increased in strength and frequency or surgery must be

employed. As to the character of the surgery required, the reader should refer to one of the modern textbooks, such as those of Berens or Duke-Elder, in which the indications for and types of surgery employed are described at length.

GENETICS OF MALFORMATIONS

To the Editor:—I recently delivered a 28 year old primipara of a hydrocephalic phocomelus at term which lived eighteen hours. The parental Wassermann tests were negative, and there were no cardiac, renal or mental abnormalities in either parent. The umbilical cord was short and friable, automatically severing itself at expulsion of the child. The parents greatly desire to have another child but fear that a similar birth might ensue. They have read about the gene theory, which states that the genes in the last child of a large family are apt to be defective. Each is the last child in respective families of seven and eight children. How should I advise them? M.D., Ohio.

ANSWER.—There is no good evidence that the genes of a last child of a large family are especially likely to be defective, although there is some evidence that the later born children in a family are more likely to have congenital malformations than are the earlier born; neither is there any increased incidence of anomalies in the children of "youngest children," as far as is known. There does appear to be an increased hazard of abnormal children in those pregnancies which occur late in the life of a mother, but this is of more statistical interest than of clinical concern. D. P. Murphy's investigations (Congenital Malformation, Philadelphia, University of Pennsylvania, 1939) lead to the conclusion that gross congenital malformations arise solely from influences which affect the germ cells prior to fertilization and that the couples who give rise to malformed offspring are reproducing inefficiently. Couples with inefficient matings possess, it seems, an excessive probability of having malformed children. Such couples may be told, Murphy states, that they have a greater chance of having malformed children than other couples, although in the individual case such a result is comparatively unlikely. When and if Murphy's conclusions are confirmed by further study, it will be possible to give more intelligent professional advice to the unfortunate parents of malformed children than can be done today.

SENSITIVITY TO SOAP

To the Editor:—I am writing concerning various soaps in relation to a 4 year old child with asthma (nonseasonal). The mother has noticed a distinct improvement since the child's pajamas and other clothing have been washed with "Octagon" soap rather than "Ivory" soap, which she had always formerly used. Extensive cutaneous tests were negative except for a positive reaction to orris root, but no change in the symptoms resulted when all known sources of orris root were removed. Does sensitiveness to Ivory soap exist? What are the ingredients in Ivory soap? Does it contain orris root? How does the composition of "Ivory" soap differ from "Octagon" soap, "Lux" soap and "Woodbury's Facial" soap? M.D., Massachusetts.

ANSWER.—It is difficult to state the ingredients of any particular soap, because the composition of soap is usually a manufacturer's secret. The exact ingredients therefore in Ivory, Octagon, Lux or Woodbury's soap cannot be stated. In general it can be said that they do not contain orris root. Orris root is a frequent constituent of powders, and any one sensitive to this powder can well pick up enough from the air at times to provide a cause for any flare-ups on the skin.

Sensitization to soap does exist and one frequently finds on testing with dilute solutions of various soaps that an individual skin may react to one or another. The general feeling is that the result on the skin comes from a combined effect of the alkali and the particular fatty acid in a given soap. There is still considerable controversy as to whether reaction is an allergic one or not. In the case of the child mentioned in the query the essential feature is adequate rinsing of clothes and the use of as little soap as possible and preferably only a soap which by experience does not produce any reaction on the skin.

CONSOLIDATION OF MIDDLE LOBE OF RIGHT LUNG

To the Editor:—The following questions have arisen concerning the physical signs in cases in which the middle lobe of the right lung is involved: In consolidation of the middle lobe only, where are the physical signs present in relation to the wall of the chest? Can any signs be heard posteriorly when only the middle lobe of the right lung is involved in such consolidation? M.D., Minnesota.

ANSWER.—The middle lobe of the right lung is in apposition to the lateral and anterior part of the wall of the chest. It is that portion of the right lung extending downward from approximately the fourth interspace. It is bounded in front by the midline and by the anterior axillary line laterally and is roughly triangular. Theoretically, therefore, all physical signs due to consolidation in this lobe should be heard on the anterior and anterolateral wall of the chest. None should be heard posteriorly. Actually, the attempt to localize pulmonary disease so sharply by physical signs alone is a hazardous procedure and is probably unwise when roentgen localization is so much more accurate.

UNDESCENDED TESTIS

To the Editor:—A boy aged 11 has a congenital undescended testis on the left side. The testis cannot be palpated in the inguinal canal and there is no hernia. He is normally developed, mentally and physically, and weighs 107 pounds (48.5 Kg.). There is no sign of any endocrine disturbance. About four or five years ago I gave him androgen injections without any effect except a very rapid increase in the length of the penis. The injections were then discontinued. Would this retained testis have any functional value? If it has not, would it be advisable to subject him to several operations to bring the organ down to its proper place, or what would your advice be? M.D., Puerto Rico.

ANSWER.—Numerous clinical and experimental studies have demonstrated that the undescended abdominal testis shows no degenerative changes before puberty. After puberty, however, examination of such a testis reveals that the organ has not undergone the normal changes incidental to puberty, and furthermore degenerative changes in the tubular cells occur. At the age of 11 years the organ retains in all likelihood its full functional potentialities. The failure of the testis to descend spontaneously and following endocrine therapy suggests that some organic obstruction to its descent is present. Considering the high frequency of malignant changes in the undescended testis, orchiopexy is usually advisable.

URINARY RETENTION IN PREGNANCY

To the Editor:—A woman aged 26, weighing 125 pounds (57 Kg.), with a blood pressure of 125 systolic and 65 diastolic, was diagnosed as pregnant seven months ago. She was given dicalcium phosphate 15 grains (1 Gm.) daily and at a date later one-half grain (0.03 Gm.) doses of phenobarbital for nausea and vomiting. Four and eight weeks later she was given adrenal cortex extract from 0.5 to 1 cc. intramuscularly on four occasions. There was no further nausea or vomiting. At the end of the third month she had not been able to pass urine for over ten hours. She was sent to a hospital, where several hours later she was catheterized and 1,800 cc. of urine was obtained. She returned home and had no further trouble until the end of that week, when the same condition recurred. Again remedies failed and she was catheterized of 1,700 cc. of urine. She was then given phenobarbital one-half grain after meals, three times daily, and at bedtime. She has continued to gain and has had no trouble since. Physical findings and laboratory tests, including a blood Wassermann reaction, have been negative. What was the cause of the urine retention? J. L. Pritchard, M.D., San Jose, Calif.

ANSWER.—The most likely cause of sudden urinary retention is retroversion of the enlarged pregnant uterus. The first attack occurred at about three months gestation and the second followed rather promptly after the first. Attacks are not likely to occur when the uterus has become sufficiently large to rise above the brim of the pelvis and become an abdominal organ. If the uterus fails to rise above the brim of the pelvis, it may become incarcerated in the pelvic cavity and continue to give rise to difficulty. The usual routine in patients in whom a retrodisplacement is discovered during the first three months of the gestation is to institute postural exercises, particularly the knee-chest position. The position of the uterus should be checked two weeks after the third missed menstrual period.

PREGNANCY IN NARCOLEPSY AND PETIT MAL

To the Editor:—1. Is pregnancy contraindicated for a patient suffering from attacks of narcolepsy and petit mal? 2. Should one advise such a patient to become pregnant, when a child is desired? The patient is 25 years of age and has suffered from this condition since her early teens. She has no convulsive seizures, but a momentary loss of consciousness. She has received amphetamine sulfate. Without this drug she will fall asleep often without warning. Her general physical condition is good. No positive neurologic findings are present. M.D.

ANSWER.—1. Pregnancy is not contraindicated for a patient suffering from attacks of narcolepsy and petit mal. The former is due to encephalitis and the cause of the latter is not known. In other words, at the present time the transmission of petit mal or any convulsive state has not been proved.

2. No. Usually a patient with petit mal does not make a good mother or parent. Certainly repeated attacks of momentary loss of consciousness would make it almost impossible for a woman to raise a child unless the job of raising the child was given to some other person. In an uncontrolled case of narcolepsy the same reason would hold as for petit mal.